



ANNALS OF THE
ROYAL COLLEGE
OF SURGEONS
OF ENGLAND

VOLUME 27

DECEMBER 1960

No. 6



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EDITORIAL (1960) LANCET, ii, 685

Seven papers reporting work on Celbenin appeared in the British Medical Journal of September 3rd, 1960, on pages 687, 690, 694, 700, 703, 706 and 708; three in the Lancet of September 10th, 1960, on pages 564, 568 and 569.



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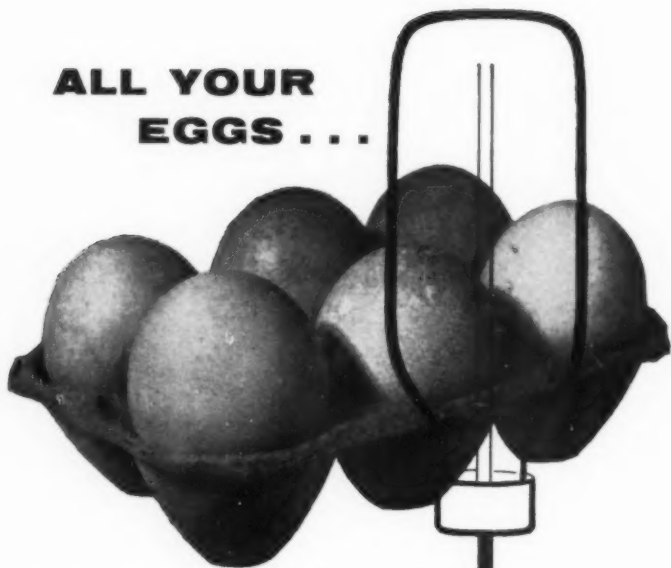
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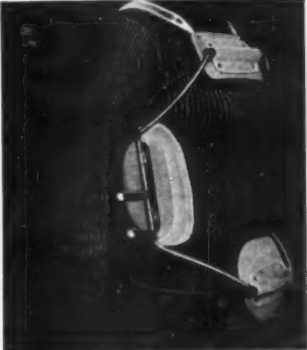
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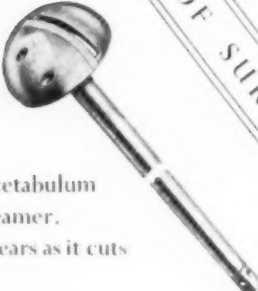
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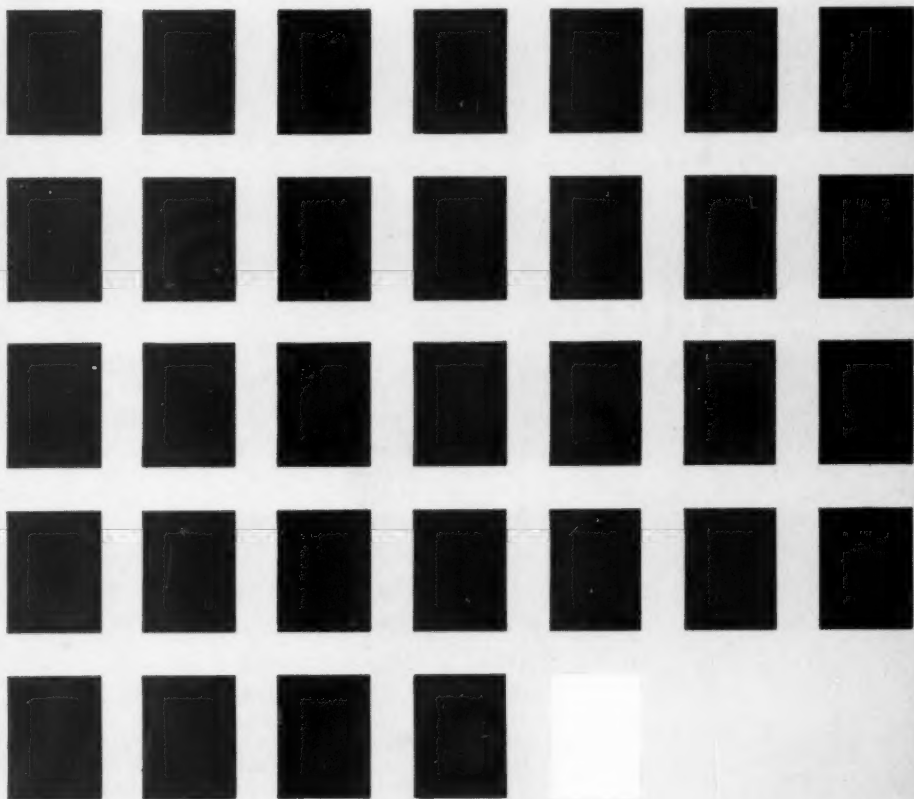
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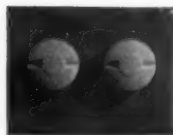
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SURGERY OF THE BILIARY TRACT

Bradshaw Lecture delivered at the Royal College of Surgeons of England

on

12th November 1959

by

A. Dickson Wright, M.S., F.R.C.S.

**Senior Surgeon, St. Mary's Hospital and Prince of Wales Hospital,
Vice-President of the Royal College of Surgeons of England**

THIS BRADSHAW LECTURE was founded in 1880 by the widow of William Wood Bradshaw, a surgeon of Reading, who had died fourteen years previously. This act on the part of his widow rescued Bradshaw from obscurity, and a long list of lecturers have every year preceded their remarks with references to his memory. His achievements were not notable, but yet, by his widow's farsightedness, his name will be remembered when others much more famous have been forgotten—indeed, he will be remembered as long as there is a Royal College of Surgeons. During his lifetime, the only surgery performed upon the biliary system was to drain abscesses that originated from the gall bladder, sometimes



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Fig. 1. Thudichum at 60 years of age.

as far away as the axilla, and from these abscesses gall stones were often obtained and continued discharging from the fistula for months and even years. It was only towards the end of Bradshaw's life that the bare possibility of operating on the gall bladder was entertained, and indeed the first operation by John Slough Bobbs was performed in Indiana a year after his death—and then only by accident.

As is so often the case, the first steps in new lines of surgical treatment are suggested by physicians who do not have to carry out the operative work. Possibly their detachment from detail permits them greater latitude of speculation, and suggestions, apparently outrageous at the time



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Fig. 2. Thudichum's birthplace, Büdingen, Grand Duchy of Hesse.

of making, lead in time to new branches of surgery. Thudichum (1829–1901) (Fig. 1), a German refugee to this country from the revolutions of 1848, first put forward the idea in 1859 that gall stones could be removed from the gall bladder if it was first marsupialized to the skin and at a second stage, a week later, the stones were scooped out. This communication (Fig. 3) was made to the West London Medico-Chirurgical Society, which he founded. Thudichum was a remarkable man who made contributions to so many subjects that he has been described as a medical Leonardo da Vinci. Biochemistry was probably his main claim to fame, but he made important contributions to public health and industrial medicine. In biochemistry he made discoveries on the constitution of brain tissue, indeed he was known as the “chemist of the

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Fig. 3. Copy of plate ii from Thudichum's *Treatise on Gallstones*. These casts of the biliary canaliculi from the centre of the stones have not been the subject of further research.

brain". In ear, nose and throat surgery he pioneered the electro-cautery, and introduced a nasal speculum not likely to be ever superseded (Fig. 4). He also made important discoveries concerning the pigments of the body. In his spare time he wrote on the chemistry of wine and beer, and produced a cookery book. His industry, indeed, matched that of Mrs. Beeton. Handfield Jones, a physician of St. Mary's Hospital,

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20 years later, in 1878, made the suggestion afresh without referring to Thudichum that an impacted stone could be removed from the cystic duct with benefit to the patient. Marion Sims and Keen in America, Kocher in Switzerland, and Lawson Tait (Fig. 5) in Birmingham acted quickly on this second hint. Sims's and Keen's patients both died, but Kocher's and Tait's patients recovered. Preceding these four operations was the one done by Bobbs of Indianapolis in 1867. In this case a large abdominal



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Fig. 4. Thudichum using his electro-cautery while assistant uses speculum.

cyst turned out to be derived from the gall bladder and not as expected from the ovary. Stones were removed and the gall bladder sewn up, and the patient survived.

The first cholecystectomy, the sixth recorded operation on the gall bladder, was done by Langenbuch in Berlin on 15th July 1882, and he acknowledged the prior work of those mentioned above, and he also added the name of Petit, who touched on the subject in 1743. So up to

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this point, 1882, Europe had provided the original ideas and had had 100 per cent. recovery from their operations, whereas America had a 66 per cent. mortality rate. In the far distance there was a hazy account of removal of a gall stone by Fabricius Hildamus, the famous German surgeon, contemporary with Ambrose Paré.

By 1884 the number of operations rose to 31, and from this time onwards the surgery of the biliary tract has progressed, until now it comes next after the appendix in providing work for the surgeon. In the development of biliary tract surgery from 1884 onwards one name stands out widely, being that of our Bradshaw lecturer of 1904—Mayo Robson of Leeds. His Hunterian Lecture of 1907 reported a large series of cases with probably the lowest death rate in the world at that time.

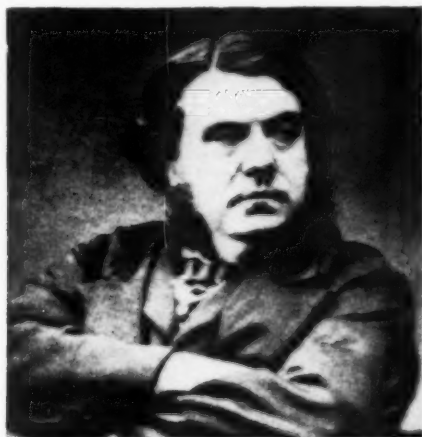


Fig. 5. Lawson Tait of Birmingham, who performed the first cholecystostomy in England.

CONGENITAL ABNORMALITIES

The biliary tract is very free from congenital abnormalities and because of their rarity provides little hazard at operation. In case after case the anatomy is monotonously the same, although often distorted by pathology. The minor variations in the blood supply of the gall bladder are of little importance, as long as one keeps close to the gall bladder when removing the organ, and deals with the individual branches rather than a formal ligature of the main cystic artery. The danger in ligaturing the main artery is that the right hepatic artery or even the main hepatic artery may be included, with resultant massive necrosis of the liver and a 75 per cent. to 100 per cent. death rate. When one artery alone is interrupted, chemotherapy may lower the 75 per cent. death rate.

The congenital variations in the bile ducts are also very rare, and the one so commonly cited, of a duct opening directly into the gall bladder from the liver bed, is one that I have never met. The cystic duct may be very long and join the common duct very close to the ampulla of Vater, and if packed with stones has to be carefully dissected out till one reaches its lower end. Provided the operation is carried out in a bloodless and well-lit field, there should be no danger from the minor variations of the cystic duct and the common duct.

Great play is made of these congenital variations when a biliary leak occurs, but in truth the real cause is to be found elsewhere, as a result of working in an obscured and restricted field and using clamps, when an aneurysm needle is the correct instrument for ligaturing the cystic duct and artery. In fact, it is best never to use forceps in this region; sharp,

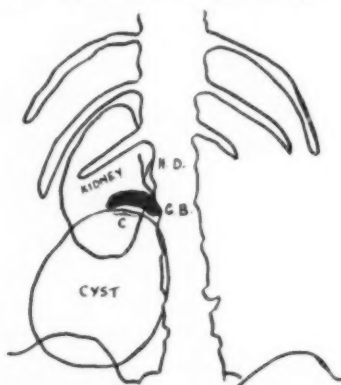


Fig. 6. Outline of an X-ray showing the cholecystographic appearance in congenital dilatation of the bile duct. The dense shadow of the gall bladder is shaped to the faint shadow of the cyst.

unexpected haemorrhage only requires gauze pressure, patience and then the diathermy. With a pair of Spencer Wells more damage can be done here in five minutes than in any other part of the body, and damage to the common bile duct has a mortality early and late exceeding 40 per cent. as well as chronic invalidism in those who survive.

The incidence of common duct injuries is a good index of the surgical discipline of a country, and if it is great the time has come to take stock, because one may be certain that other less obvious mistakes are being made in other less apparent ways.

The grosser congenital variations which call for surgery are rather rare. In the jaundiced newborn attempts are made to join a dilated common duct above a congenital stenosis to the duodenum or intestine. In other cases

SURGERY OF THE BILIARY TRACT

there is nothing to join as all the ducts are stenosed, even in the substance of the liver. Occasionally the ingenious operation of Longmire may serve, when the ducts are dilated in the substance of the liver, as shown by trans-hepatic cholangiography carried out pre-operatively or with the liver exposed at operation.

Congenital cystic dilatation of the common bile duct (Fig. 6) is a bizarre condition which may obstruct the flow of the bile and cause attacks of hepatic fever. Sometimes it is so large as to cause gross visible swelling of the abdomen—even mistaken for pregnancy. The cyst may become displaced periodically across the vertebral column, producing a crisis which the patient learns to cure by the appropriate manipulation. The X-ray appearance which I described on one occasion is a peculiar but diagnostic cholecystogram, while a pyelogram shows that a hydronephrosis of the right kidney may be produced. The cyst may rupture accidentally, as in a case I reported in 1933. At post mortem the cyst, by longstanding pressure on the right hepatic artery, had caused complete atrophy of that lobe, and the left lobe had by its hypertrophy resembled the spleen, so that the non-committal and erroneous medical diagnosis before post mortem had been hepatomegaly and splenomegaly, the "hepatic" factor being the large cyst and the hypertrophied left lobe of the liver the "spleen". The operation to repair a duct affected with cystic dilatation may be hazardous. If the cyst can be excised this should be done, and the bile duct reconstructed and if necessary reimplanted. If this proves too difficult, the cyst can be anastomosed to the duodenum.

CHOLECYSTECTOMY

The operation for the removal of the gall bladder for calculous diseases is one of the most satisfactory in surgery. It saves the patient from the characteristic dyspepsia and from the threat of crises of pain when stones impact and block the escape of the gall bladder contents—the so-called biliary colic. Timely removal prevents a long series of disabling complications, many of them with a considerable mortality rate. The escape of a stone into the ducts leads to obstructive jaundice, infective cholangitis, and biliary cirrhosis. The chronic inflammation of the gall bladder leads on to malignant change of a very difficult character. The pancreas is also disturbed by the gall bladder disease, especially when a stone escapes into the common bile duct. It becomes the seat of acute, relapsing or chronic pancreatitis, with attendant diabetes at times. Chronic pancreatitis also leads to malignant change in the pancreas, as does biliary cirrhosis in the liver. It would also seem that carcinoma of the bile ducts and the ampulla of Vater are more frequent in the presence of gall stones. In the fibrosed gall bladder the gall stone may be extruded into the adherent duodenum producing a dangerous form of intestinal obstruction. Perforations of the gall bladder may occur in an acute attack, or spontaneously, the so-

called pin-hole perforation leading to peritonitis and sub-phrenic abscess. Long impaction of a stone may lead to huge mucocoeles with a risk of pseudo-myxoma peritonei. Gall bladder disease seems to cause oesophageal reflux and heart burn and may lead to hiatus hernia by inflammatory shortening of the oesophagus. The heart is also said to be affected deleteriously by gall bladder disease.

This is a formidable list and should cause the surgeon to press for cholecystectomy whenever the stones are discovered, even if the patient is symptom free.

The diagnosis by the Graham test has become a great boon, but it is a poor test for early disease, and a gall bladder causing severe dyspepsia may visualize normally, as indeed does one which is full of stones. Sometimes the gall bladder concentrates so well that the stones do not show, being obscured by the dense shadow. Posturing the patient for the X-ray series will prevent this mistake (Fig. 7). The smallest stones will then produce a horizontal line in the shadow if the patient is standing. A gall bladder affected by cholesterosis may give a good dye concentration and only if the cholesterol deposits are polypoid will they be demonstrated by X-ray photographs.

More delicate tests will be devised, I am sure, and are being worked on at present. It is well to remember, too, that the gall bladder is visualized many times after one ingestion or injection of tetra-iodo-phenolphthalein, due to a circular reabsorption from the intestine and re-excretion by the liver. One of these re-visualizations may coincide with a subsequent barium meal, and an erroneous diagnosis of fistula between gall bladder and duodenum be made. A patient of mine made the laborious journey home from Hong Kong because of this phenomenon.

The operation of cholecystectomy may be commenced from the fundus or from the cystic duct or by a combination of both; when acutely inflamed, the first is the best. The haemostasis must be perfect and maintained with the help of diathermy from beginning to the end of the operation. Gel-foam is slipped beneath the stitches closing the gall bladder bed, and again on top of this suture line, and another piece is used to cover the sewn edge of the gastro-hepatic omentum. All is completely dry at the end, and as there is nothing to drain, no drainage is used. The operation is nowadays extended to the acute stage of the disease, and in the majority of cases removal is no more difficult than with un-inflamed cases, if the usual step of emptying the gall bladder of fluid and possibly stones is done before the dissection commences. Occasionally removal of stones is all that is possible, but at other times all the gall bladder is cut away except the mucous membrane adhering to the liver, which can be destroyed, as recommended by Thorek, by diathermy. An acute attack of cholecystitis is often a heaven-sent opportunity to get the erstwhile reluctant

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patient to agree to cholecystectomy. At the end of the operation the field looks very little different from the chronic case, and, with all bleeding controlled and the gall bladder bed carefully sewn up, there is again no need to use a drain—only to dust the peritoneum with sulphonamide powder with streptomycin (1 per cent.).

COMMON DUCT SURGERY

On this subject there has been a good deal of reckless talk, such as the statement that the duct should be opened in every case as unsuspected



Fig. 7. To illustrate the value of the erect posture in the diagnosis of gallstones. Some float at the level corresponding to their specific gravity in the mixture of bile and contrast medium whilst the heavier stones are easily seen resting on the fundus.

stones are so common, or again the statement that to leave a stone behind in the common duct is as much of a surgical crime as to leave a swab in the abdomen. Contrary to these views, it is my custom to explore the duct only when the history and the intravenous cholangiogram is suggestive, or where the palpation of the duct, which is part of every cholecystectomy, gives the sensation of a stone slipping up and down the duct. I do not regard the leaving of a stone in the common duct as culpable, and there is no great shame in having to re-operate for this, and patients do not seem

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to resent it if appropriate explanations are made. Furthermore, when the gall bladder is acutely inflamed it is unwise to explore the common duct.

The common duct is a delicate tube with no muscle in its walls, and it is subject to spontaneous stricture formation even without any disease of gall bladder or adjacent structures. In other cases a stricture is associated with long-standing gall-stone disease and cholangitis. Nearby inflammation in the form of pancreatitis or duodenal ulcer will also cause

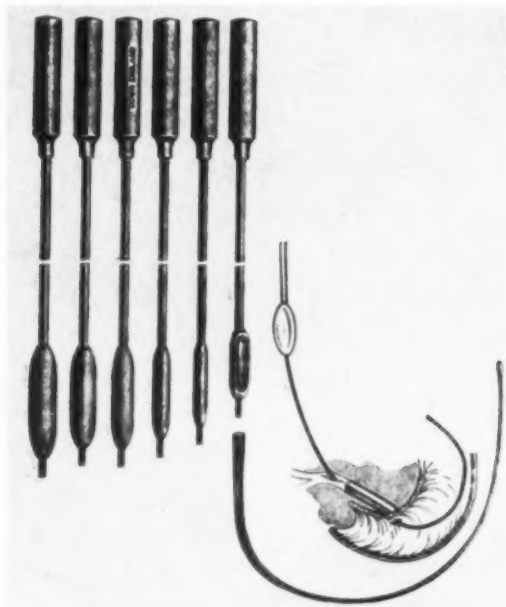


Fig. 8. One of many recommended procedures involving much trauma to the duct and the sphincter of Oddi and the duct of Wirsung.

annular duct strictures. The common duct differs from the urethra in this way, as urethral stricture only occurs after severe inflammation or trauma. It is reasonable, therefore, to suppose that routine operative trauma, such as excessive exposure and mobilization of the ducts, might do harm in the way of reactionary fibrosis. The incision and sewing up of the duct, plus passage of scoops and forceps along its lumen (Fig. 8), and the forcible dilatation of its lower end, followed by the irritating effect of indwelling T-tubes, all amount to sufficient trauma to produce a stricture of the common duct without the surgeon making any acknowledged mistake.

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On this account I have made it a practice for twenty years to avoid opening the common duct, as I believe this procedure harmful and unnecessary; moreover, the blind dilatation or division of Oddi's sphincter from above with a bougie or special sphincterotome is, I think, unwise, as the trauma in the ampulla may injure the pancreatic duct and lead to pancreatitis; moreover the effects of dilatation are ephemeral. I can only recall exploring the common bile duct above the duodenum in one case, and this was the third operation on this duct and still the patient had rigors and jaundice. The common duct was very large, and exploration from the duodenum yielded nothing. The duct was opened and a finger passed upwards, and a large stone found impacted high in the left hepatic

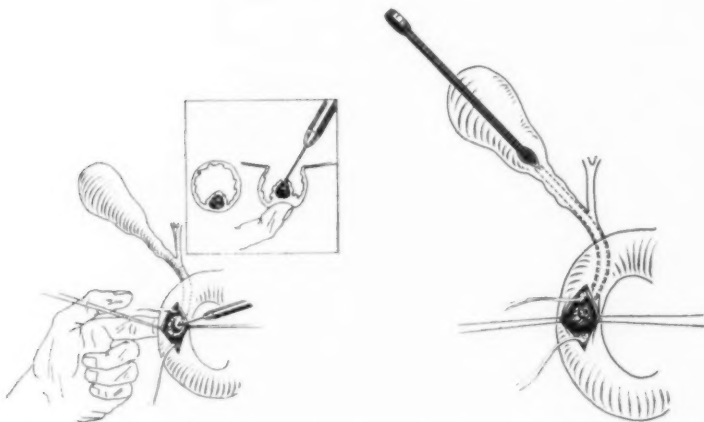


Fig. 9 (left). The impacted stone is elevated by a finger behind the duodenum and the lower end of the duct opened with the diathermy.

Fig. 10 (right). The papilla can be elevated and made conspicuous by means of the Lister's bougie passed through the neck of the gall bladder.

duct. The surface of the left lobe of the liver was studded with the characteristic whitish swellings of dilated bile ducts. These swellings are very conspicuous, but the contents (white bile) are not under pressure as a rule.

When there are stones in the common duct the transduodenal method of exploration is one I have used now for many years. There is no difficulty in finding the papilla, it usually can easily be seen and felt (Fig. 9). It is often visualized by a stone being jammed just above it, or bile can be milked from it with the finger. If there is any difficulty, a bougie can be passed via the cystic duct and the papilla displayed (Fig. 10), or an injection of saline through the cystic duct can be seen to flow into the duodenum.

After identification the lower end of the duct is slit up by incising down with a diathermy needle on an impacted stone or the tip of the bougie in the duct (Fig. 11) or between the opened blades of a small forceps passed into the ampulla from the duodenal end. It is important that this incision is made upwards from the opening of the papilla, so as not to injure the pancreatic duct. The stones will now pour out into the duodenum with slight milking from above (Fig. 12), and with them comes the sludge, grit and mucus of the infected cases. To finish off, a jet of saline can be sent down the duct from a syringe inserted into the cystic duct (Fig. 13). If the stone in the common duct is very large, then forceps

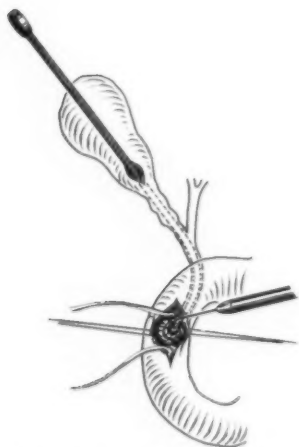


Fig. 11 (*left*). The aperture of the common bile duct is enlarged by splitting the tissues in this manner with this diathermy using the head of the bougie to give the direction.

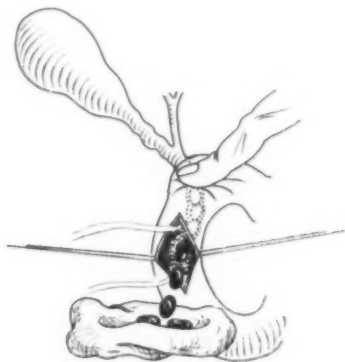


Fig. 12 (*right*). The stones flow from the common duct with great ease aided by finger pressure on the common duct.

pass readily through the divided ampulla and it can be drawn out or broken up and milked out from above piecemeal, followed by a vigorous wash-out. The opening of the duct of Wirsung may now be gently dilated, but only if pancreatitis is present. The wide-open duodenal orifice allows free drainage to care for any stone or sludge that may be left in the common duct. The duodenum is now closed with suture in two layers and omental overlay, and it naturally heals easily and well as it is healthy tissue. The gall bladder is removed last of all, having served a useful part up till now for traction, passage of bougies, irrigations and so on. Peritonealization is completed and the abdomen closed without any drainage, and the patient seems to recover quickly and easily as with a simple cholecystec-

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tomy, and is away on the eighth day. Occasionally the stomach dilates and needs aspiration, and I have had one case of melaena which cleared up without trouble in a jaundiced patient.

There are other advantages of the trans-duodenal exploration apart from its being the logical way to approach a duct such as the common bile duct. An unsuspected carcinoma of the ampullary region may be discovered, or a small carcinoma of the head of the pancreas, close to and obstructing the duct. If these conditions are found, the duodenum can be

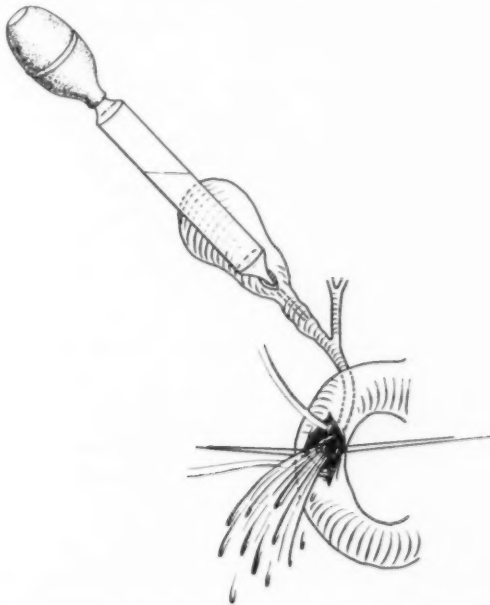


Fig. 13. The common duct can be conveniently washed out in this manner.

closed and a routine pancreatico-duodenectomy carried out, without having disseminated the growth by intraperitoneal biopsy. Biopsy of the pancreatic head through the posterior wall of the duodenum is a safe and satisfactory procedure as a rule. In certain inoperable jaundiced malignant cases where a probe can be passed up the duct from the papilla, or down from the dilated duct, dilatation of the malignant structure can be carried out and a plastic tube inserted and fixed firmly with transfixing silk stitches and is preferable to a short circuit between distended gall bladder and intestine.

STRICTURES OF THE BILE DUCTS

These may arise spontaneously or occur after operations, and there should be no haste in operating upon them. Remember the very small opening of the papilla through which bile and pancreatic juice pour easily as long as they are normal and free from infection. The bile ducts should therefore drain easily through a stricture which is as narrow as the papillary opening. Cases of stricture with rigors and jaundice should therefore be treated thoroughly with aureomycin and the bile may be sterilized by this antibiotic, the only one to be secreted in the bile. Should the bile return to normal fluidity, it will flow easily by the stricture and operation will be unnecessary. In four post-operative cases referred to me I have found this adequate, and the patient has escaped a rather serious operation and settled down to life with a strictured duct but no jaundice.

Finally, before operating on suspected common bile duct damage, great judgment should be shown. There never should be any hurry—it is no emergency—a few months more of jaundice or bile leakage does no harm. Anxious relatives and second opinions should be resisted in their efforts to jockey one into precipitate action. In the cases where the ligature has slipped and a large collection of bile has formed intraperitoneally and has not found its way for readily understood reasons out via the drainage tube, the patient becomes jaundiced by the absorption of the bile from the peritoneal cavity, and very ill from peritonitis and dilatation of the stomach. After a period the bile comes to the surface via the main wound and independently of the tube which looks rather forlorn, in a separate puncture. The biliary escape, at first torrential, relieves the patient of the jaundice. Later, when this fistula is well established, a sinogram is carried out. This may be very misleading at first, because of all the inflammatory exudates and compressions. The contrast may not find its way into the duodenum and this may lead to diagnosis of common duct damage. Operation at this stage is most injudicious, as there are still present gross inflammatory changes due to the biliary peritonitis, and operation on such tissue will prove a delusion and a disappointment. After a month or two the fistula may close and the stools acquire normal colour, showing that the common duct was uninjured, but its bile-carrying function lost temporarily as a result of the compressive inflammatory exudate resulting from the peritonitis. Patience will be rewarded very often in these cases, and if after the fistula closes the patient has recurring attacks of jaundice and rigors, then aureomycin or chloromycetin should be given a trial. The blockage may be due to bile sludge and mucus above the stricture, and if the bile can be restored to normal with antibiotics it will flow through the narrow duct quite satisfactorily—remembering that it normally escapes into the duodenum through a minute orifice.

If operation has to be done, the duodenum is mobilized and opened first, and a bougie passed up from the lower end and the stricture level

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discovered. The bougie is removed, a rubber catheter passed and retrograde cholangiogram is done. This often shows a passage still present which can be dilated. If a gap is displayed and it is short, then excision and an end-to-end anastomosis is done, and I prefer not to use an indwelling tube, relying on the division of the sphincter to provide drainage, and the use of aureomycin to keep down infection and scar tissue at the suture line. I have a particular aversion to the T-tube. If left in for the long times recommended it encrusts with deposits, and when removed some of this crust breaks off and is left in the duct and acts as does a calculus. Moreover the T-tube sometimes breaks when pulled upon, and I have on two occasions had to operate to remove the crosspiece and found it completely blocked and encrusted with bile debris, the bile finding its way out with difficulty in the space between the tube and the duct wall.

When there is a large portion of the duct missing, then the dilated duct is anastomosed to the divided jejunum by the Roux method, taking care to use the distal end of the divided intestine. The stitching must be meticulous, with black silk thread, to reduce the scar formation and to help in orientation if there is a repeat operation. At this repeat operation the jejunum is opened just below the anastomotic line, and the opening of the duct into the jejunum dealt with inside the jejunum by dilatation or incision. I have reoperated on two occasions cases with the proximal end of the jejunum joined to the common bile duct.

In certain cases no bile duct can be found in the portal fissure after the most diligent search and needling. Recourse must then be had to the method of Longmire, transecting the left lobe of the liver and anastomosing the divided left hepatic duct to a Roux loop of intestine.

In conclusion: surgery of the biliary tract is a good test of surgical skill. There is no need for hurry or rashness, and if the general principles of surgery are carefully observed the results probably surpass those in any other field of surgery; but ignorance, carelessness, hurry, or over-confidence may provide one of the greatest tragedies of the surgeon's life. The common duct might well be spared the trauma associated with incision, exploration with bougies, scoops, stone forceps and sphincterotomes and, instead, exploration done from the duodenal end by the methods described in this lecture. Indwelling tubes are also a possible cause of stricture formation and cholangitis and should be used far less than they are at present.

I wish to acknowledge my indebtedness to The University of Pennsylvania Press, publishers of *Thudichum—Chemist of the Brain*, by Professor D. L. Drabkin, for allowing me to reproduce Figs. 1, 2, 3 and 4.

SURGICAL TREATMENT OF MANDIBULAR PROGNATHISM

Hunterian Lecture delivered at the Royal College of Surgeons of England

on

4th April 1960

by

J. H. Hovell, F.D.S.R.C.S.

The Royal Dental Hospital of London

THE RELATIONSHIP of the mandible to the maxilla in the antero-posterior plane both in size and position is subject to great variability, which is but a part of the normal variation of the entire facial and cranial form. Walther in a recent survey of 1,000 cases estimated that 70.1 per cent. fall within the normal range, or were only mildly outside it, 25.6 per cent. were postnormal and 4.3 per cent. prenormal in their dental base relationship. The degree of variation of a small proportion of the last group is such that neither a good occlusal nor aesthetic result is obtained by orthodontic tooth movement. It is these cases for whom surgery is the only treatment.



Fig. 1. Models of case of mandibular prognathism of such severity that only the lower third molars occluded with the upper incisors during lateral excursions.

The literature on surgery of mandibular prognathism reveals a plethora of operative techniques for its reduction, but unfortunately little critical evaluation of the results achieved. Blair in 1907 described a blind sliding osteotomy of the ascending ramus with division by a Gigli saw, a method later popularized by Kostecka in 1931 and introduced into this country by Bowdler Henry. Apart from this, however, little work was done here until after the 1939-1945 war. Most operators commenced by doing blind ascending ramus slides, but many of us were so dissatisfied by some of the results that we turned our attention to other procedures.

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It is my intention to-day to try to make a critical survey of mandibular prognathism and its treatment based on over 100 cases treated by various methods.

I must here express my thanks to Mr. Bowdler Henry, who has most kindly allowed me to include a not inconsiderable number of cases treated by him at the Royal Dental Hospital, some over 25 years ago.

As only excessive degrees of normal variation are included in this survey, cases of mandibular prognathism associated with cleft palate and acromegaly have been excluded, as has also a case of post-pubertal excessive growth, self limiting, of unknown cause.

First the true necessity for operative correction of this condition must be assessed. The accepted reasons are as follows:

- (a) To improve masticatory efficiency.
- (b) To conserve the health of the dento-alveolar structures.
- (c) To cure or prevent temporo-mandibular joint dysfunction.
- (d) To facilitate prosthetic treatment of the edentulous case.
- (e) To improve speech.
- (f) To improve facial aesthetics.

(a) In mild degrees of prognathism masticatory disability is confined entirely to incising. The patient finds it difficult or even impossible to bite such foods as fruit, celery and sandwiches.

In more severe cases the occlusion and efficiency of the cheek teeth become increasingly impaired until a stage may be reached in which virtually no teeth can be brought into functional occlusion (Fig. 1).

(b) Owing to their faulty bucco-lingual inclinations and relationships excessive strains are put upon the supporting structures of the occluding

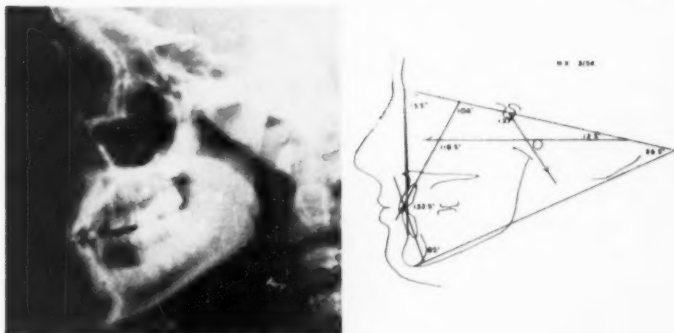


Fig. 2. Lateral X-ray and tracing of traumatic incisor relationship showing resorption of incisor apices.

cheek teeth during function, and on the other hand the unopposed incisors suffer periodontal disease as a result of disuse. Early loss of the teeth is therefore usual in these cases. Orthodontic treatment, even if possible, may well be of no advantage from this point of view. In fact in some cases movement of upper incisors into correct labial relationship with lowers may produce a very traumatic bite. Figure 2 shows an orthodontically treated case in which the incisors had to be bitten forward every morning before the cheek teeth could be brought together. Apical resorption is already commencing and these teeth are doomed.

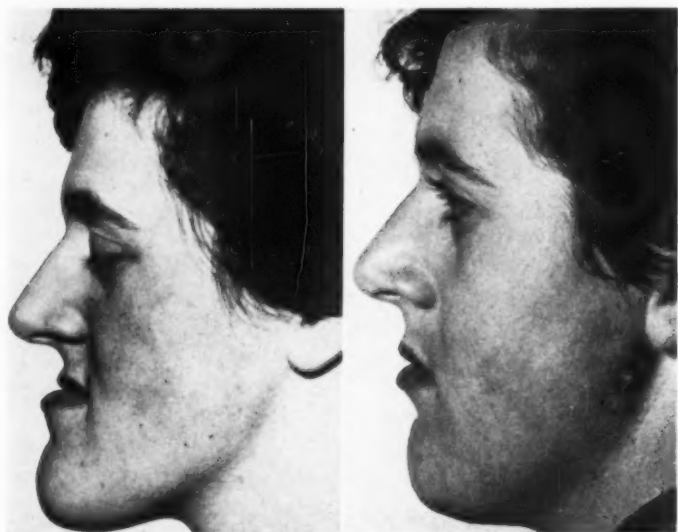


Fig. 3. Photographs of case (a) before, (b) after reduction of mandibular prognathism.

(c) It is my experience that temporo-mandibular joint dysfunction does not occur with the more severe degrees of prognathism but only in the milder cases! In these cases premature dental contacts occur and produce reflex mandibular displacement during closure. Most of these can be treated by orthodontics and occlusal equilibration. In only four cases in my series has reduction of mandibular prognathism been undertaken for temporo-mandibular joint dysfunction.

(d) After the inevitable early loss of the teeth the prosthetist is often left with an impossible task—comfortable dentures cannot be made. In this series, however, only two cases were treated after loss of the teeth in order to overcome this problem although a further six cases have been operated upon immediately prior to removal of the teeth as a prophylactic measure.

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(e) Faulty speech is not infrequent on account of the incorrect relationship of the tongue with the incisor teeth. This is never made worse by operation but may well be improved. No recordings have been taken, so assessment has been entirely on the patients' own statements.

(f) The appearance of these patients is often so bad as in itself to make operation desirable. Figure 3 shows the typical improvement in appearance that can be obtained.

An analysis of the facial skeletal pattern of 85 of these cases was undertaken, using tracings from lateral skull radiographs. No lateral skull tracings were taken of a proportion of the earlier cases, which therefore could not be included in this survey.

A typical tracing with points used and angles measured is shown in Figure 4.

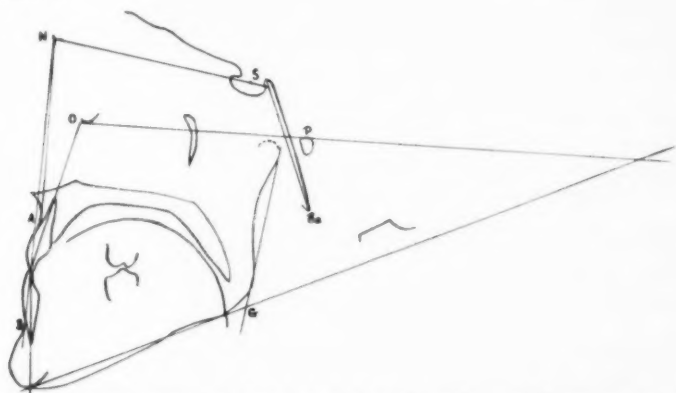


Fig. 4. Lateral tracing of lateral skull showing points used in assessment of skeletal pattern.

It was hoped that some correlation in the variations of these angles would lay the basis for a classification of the different types of facial skeletal pattern in which mandibular prognathism may occur. It was also hoped that the degree of success of certain operative procedures might be associated with certain skeletal patterns. Other than a very high degree of correlation between gonial angle and Frankfort mandibular angle none whatsoever was found. There is therefore no mathematical rule of thumb by which a classification can be made and to which treatment can be related.

I then turned to the overall facial skeletal pattern composed of non-related variations of the numerous more or less artificial landmarks which have been set up for cephalometric analysis and which serve so well for longitudinal growth studies.

On examining these patterns the following extreme types could be distinguished:

1. Mandibular prognathism based upon total facial prognathism.
 - (a) With a low Frankfort mandibular angle.
 - (b) With a high Frankfort mandibular angle.
2. Mandibular prognathism based upon a mesognathic facial skeletal pattern.
 - (a) With a low Frankfort mandibular angle.
 - (b) With a high Frankfort mandibular angle.
3. Mandibular prognathism based upon total facial retrognathism.
 - (a) With a low Frankfort mandibular angle.
 - (b) With a high Frankfort mandibular angle.

There were, however, so many intermediate patterns that this attempt at classification also proved useless and the conclusion was reached that an attempt to classify these cases is impossible and of no value in diagnosis and treatment planning.

Figure 5 shows some of the different patterns based upon analysis of 85 lateral radiographs. It is worthy of note that 68.2 per cent. of the cases fell into group (2) and only 14.1 per cent. into group (3), while 17.7 per cent. actually had a total facial prognathism. This is contrary to the widely held belief that this skeletal variation is a combination of maxillary retrognathism and mandibular prognathism.

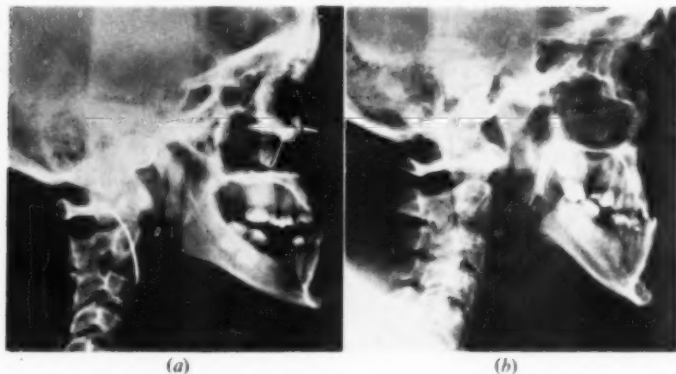


Fig. 5. Various types of skeletal pattern:

- I. Mandibular prognathism based upon total facial prognathism. (a) With a low Frankfort mandibular angle. (b) With a high Frankfort mandibular angle.

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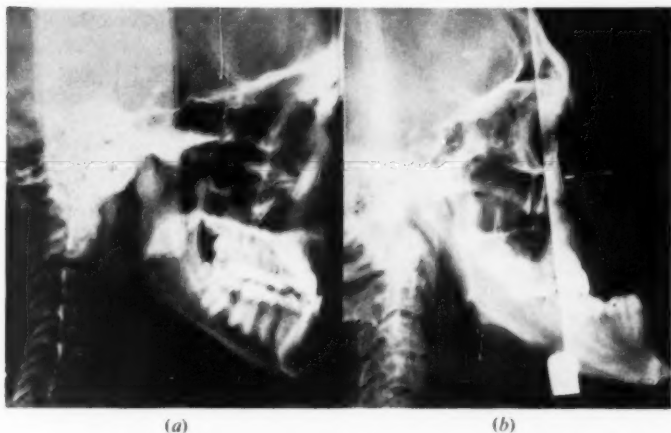


Fig. 5. II. Mandibular prognathism based upon a mesognathic facial skeletal pattern. (a) With a low Frankfort mandibular angle. (b) With a high Frankfort mandibular angle.

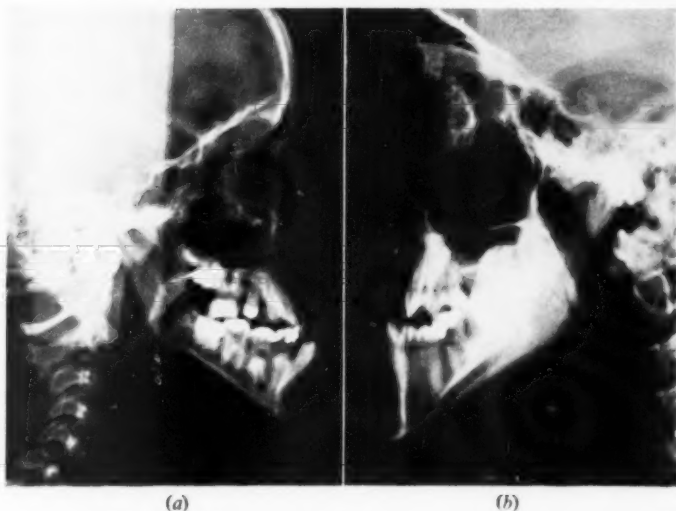


Fig. 5. III. Mandibular prognathism based upon total facial retrognathism. (a) With a low Frankfort mandibular angle. (b) With a high Frankfort mandibular angle.

The angle sella-nasion A point was used in this estimation, angles from 76° to 84° being taken as mesognathic and angles above and below these as prognathic and retrognathic respectively.

The mean S.N.A. angle for the whole group was 80.25° , surprisingly close to the estimated normal for the whole population.

The mean Frankfort mandibular angle was 29.9° . This is above the accepted normal mean and is associated with the high gonial angled mandible frequently found in these cases. The length of the lower third of the face is therefore increased and this is not infrequently associated with an anterior open bite.

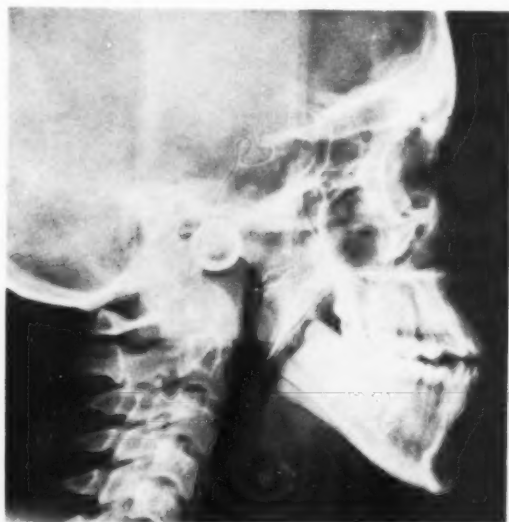


Fig. 6. Post-operative X-ray of open ascending ramus slide.

The next step was to analyse the results of treatment and to determine whether poor results were related either to the original occlusal condition or to the operative procedure performed or a combination of the two.

The operative procedures used for the correction of mandibular prognathism may be divided into three main groups:

- (1) Operations on the ascending ramus above the mandibular foramen:
(a) blind, (b) open with fixation of fragments (Fig. 6). These are the various sliding osteotomies.

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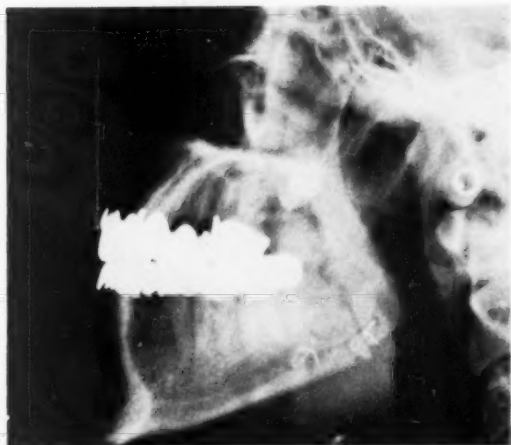


Fig. 7. Post-operative X-ray of an angle osteotomy.



Fig. 8. Post-operative X-ray of a body osteotomy.

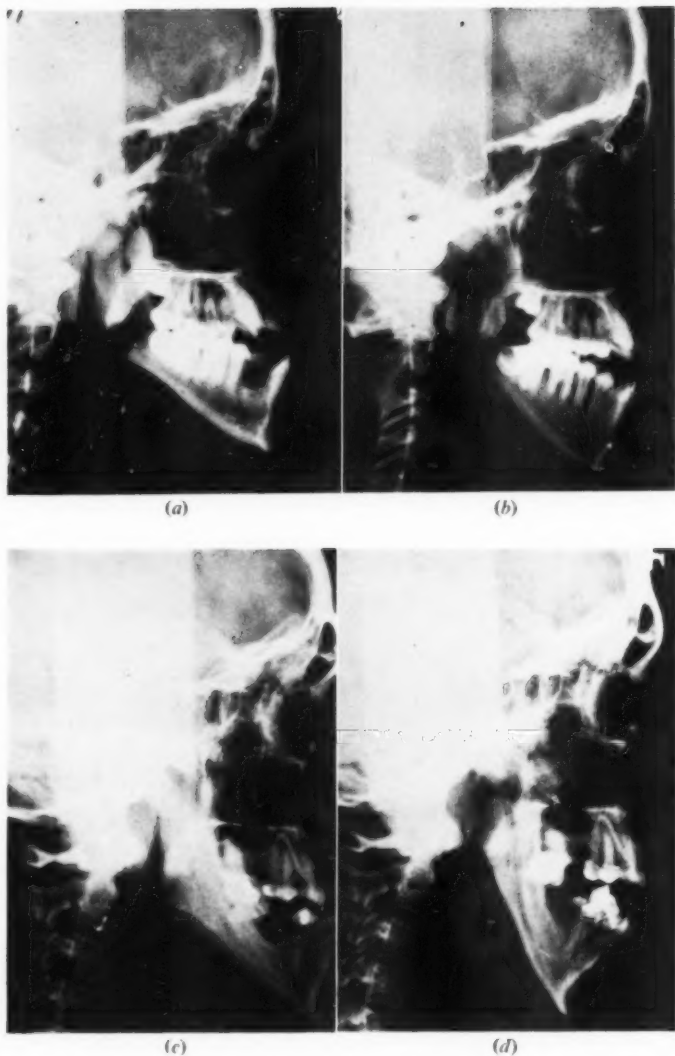


Fig. 9. (a) Pre-operative X-ray showing anterior open bite. (b) Post-operative X-ray showing increased anterior open bite after a blind ascending ramus slide. (c) Pre-operative X-ray showing no anterior open bite. (d) Post-operative X-ray showing severe anterior open bite after a blind ascending ramus slide.

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- (2) Operations between the mandibular foramen and the second molar tooth. An osteotomy in the region of the angle (Fig. 7).
- (3) Operations in the tooth-bearing area of the body; an osteotomy usually in the second premolar and first molar region (Fig. 8).

The differing procedures within these three major groups are too numerous to be listed individually.

The numbers of cases treated in the different categories were as follows:

		<i>Fully recorded</i>	<i>Incompletely recorded</i>
Slides	{ blind	12	15
	{ open	6	1
Body osteotomies		38	8
Angle osteotomies		20	1
Obwegeser procedure		1	—



Fig. 10. Effect of traction upon teeth during period of fixation.

The main reasons for incomplete recording were lack of lateral radiographs in the earlier cases and failure of many of these to return when recalled for late follow-up.

It is surprising that in all my cases only one has expressed dissatisfaction with the result obtained. She considered that the jaw had not been sufficiently set back and requested a further operation.

My own assessment of the results is not so good. Many cases fell short of what had been intended, and some were very bad.

Four major troubles were apt to arise. First the persistence or occurrence of an anterior open bite not previously present. Figure 9 shows two such cases, the first having an anterior open bite before treatment and the second developing one afterwards.

It was in the early cases, all blind sliding osteotomies, that this proved to be a major complication. It often proved impossible at operation to reduce this anterior open bite, and screw clamps and elastic traction were used during the post-operative period to overcome it. Figure 10 shows the effect upon the lower anterior teeth of such traction. The position of the bone is unchanged, the teeth are merely pulled out of their sockets. They tend to return to their previous position when the splints are removed, hence the relapse to an anterior open bite.

In blind slides in which fixation was removed in under three months the occurrence of an anterior open bite appeared to be inevitable. When fixation was maintained for a longer period than this only 50 per cent. developed an anterior open bite, and this often so slight as to be easily remediable by grinding the posterior teeth. 20 per cent., however, developed an open bite of 4 mm. or over. The average duration of complete fixation for these cases was 3.9 months, followed frequently by a further period of elastic traction or fixation between meals. One of these cases I have already shown had splints finally removed 11 months after operation.

It became evident from these experiences that in order to avoid a post-operative open bite it was essential that the fragment should be repositioned at operation without any tension on the tie wires or locking plates. It proved impossible to be certain pre-operatively that this could be done. In addition the prolonged period of immobilization necessary was not merely an inconvenience to the patient but often resulted in much loss of weight and actual ill-health.

The immediate post-operative inability to reduce an anterior open bite was attributed to tension on the structures attached to the ascending rami and angles, these structures being (a) muscular, the masseter and internal pterygoid muscles; (b) ligamentous, the speno-mandibular ligaments; (c) fascial, the deep cervical fascia, which is attached to the lower border of the mandible and is very strong opposite the angle whence it runs to the anterior border of the sterno-mastoid, the zygomatic arch and a thickened portion extending to the styloid process.

The total pull exerted by these structures is such that as the angle of the mandible is displaced backwards it is also pulled upwards. The posterior teeth act as a fulcrum and the menton is therefore depressed producing the anterior open bite.

In all the sliding osteotomies but one, the Frankfort mandibular angle was increased post-operatively, the average being from 31° to 35.2° , thus demonstrating the rotation of the body of the mandible during its backward displacement.

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The anterior open bite occurring after the removal of fixation was attributed partly to muscle pull displacing the bone, partly to teeth pulled out of their sockets during fixation returning to normal position. I shall return to this subject later when discussing the pros and cons of the different operative procedures.

Mention must be made here of the anterior open bite due not to skeletal pattern but to an anterior tongue thrust. Skeletal surgery is useless in these cases and two cases mistakenly treated by me by a body osteotomy relapsed completely. In any case of anterior open bite in which the Frankfort mandibular angle is low or the degree of prognathism is slight the presence of this aetiological factor must be particularly suspected.

Some anterior open bites of mild degree were also present after osteotomies in the region of the angle or the body. In the body this amounted to 13 per cent., of which all but one were in the first 50 per cent. of cases treated. This was attributed to incorrect sectioning of the bone as a result of inaccurate pre-operative planning and with increased experience has virtually been eliminated.

The anterior open bites in the region of the angle amounted to 15 per cent., again due in the main to inaccurate pre-operative planning. In one case the occlusion was such that an anterior open bite was not correctable by this procedure, but it was felt that to obtain a good buccal segment relationship was the more important requirement.

Delayed union was the second complication that arose. This again was a major problem for the most part only in the blind sliding osteotomies. It has already been seen that the average time of immobilization in these cases was 3.9 months and in eight of the 27 cases treated in this way extended to over six months.

Several of the earlier body osteotomies had delayed union, and in one case there was bilateral non-union with firm fibrous union one year after operation. It would be expected that attachment of the supra-hyoid muscles should produce an anterior open bite in these cases. Strangely this does not happen and the latter case eventually united without the need for subsequent surgery. In three cases infection arose around wires necessitating their removal. In the last twenty cases neither infection nor delayed union had arisen, and the average duration of intermaxillary fixation has been four weeks with a further two weeks fixation by locking bar between the fragments. This is attributed to improved planning and operative technique.

Iliac crest bone grafting was carried out on three cases, but the slight increase in speed of union did not appear to justify this additional procedure with considerable after-pain, increased stay in hospital and several weeks of impaired mobility. It was therefore discontinued.

In no case of angle osteotomy has there been delay in union. The average period of immobilization has been six weeks, followed by elastic traction for a further two weeks between meals. This is slightly longer than with the body osteotomies, due to the absence of teeth on the proximal fragment and the consequent inability to maintain fixation across the fracture line after removal of intermaxillary fixation. This good union is attributed to autogenous grafting with the portion of bone removed, which is possible because the mouth is not entered and the field is sterile.

The third post-operative complication is partial relapse to the Class III occlusion. Such relapse occurred in all cases in which the incisors were not completely locked by overlap in their correct labio-lingual relationship. This was at first attributed to some degree of return to the pre-operative mandibular morphology, and unsuccessful attempts to prevent it were made by prolonging the time of fixation. Cephalometric analysis revealed that in all but two cases this was not the cause. In the first six months after removal of fixation there was an average increase of 7.2° in proclination of the lower incisors, from a pre-operative mean of 74.8° to a post-operative mean of 82° . The lower buccal segments frequently followed the lower incisors in this mesial movement, giving the impression that the entire mandible had grown forward. When the incisor relationship was locked labio-lingually the proclination of the lower incisors was reduced in amount and was accompanied by an equivalent proclination of the upper incisors. A traumatic incisor relationship was thus produced similar to that already shown resulting from orthodontic treatment.

This not only fits in with some recent views upon the influence of soft tissue morphology in shaping the dental arches, but also gives fresh information upon the role played by the tongue. In all cases the position of the hyoid was changed post-operatively, the body moving either upwards or backwards or a combination of both. Moreover its average displacement appears to be greater than that of the mandible at the gnathion, i.e. a mean of 1.31 cm. against 1.24 cm.

The tongue position, originally low in the majority of cases, was only changed in a third of the cases, no change being detectable in the remaining two-thirds.

Again, contrary to expectation, the width of the lower arch showed a mean increase of only 1.2 mm. in the first molar region (this increase was only estimated for obvious reasons on angle osteotomies and slides). This would appear to indicate that tongue morphology is not readily alterable by changes in its bony environment. When the gnathion is displaced distally the tongue is not in the main shortened antero-posteriorly, rising higher in the oral cavity and by widening causing considerable arch expansion. Instead it tends to maintain its form, proclining the lower incisors and displacing the hyoid. The cases in which there is a change in

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tongue position can readily be explained by a pre-operative forward habit resting posture to obtain tongue to lower incisor contact. This latter statement, however, is purely hypothetical as no pre-operative analysis of tongue resting posture was carried out.

An important indication in treatment planning is afforded by these results. There must be an over-correction of the Class III incisor relationship to allow for post-operative lower incisor proclination. In the majority of cases this rules out the employment of inter-maxillary fixation by means of eyelet wiring or similar techniques, as the cheek teeth have to be placed into an occlusally unstable position in order to obtain the desired incisor relationship. Cap splints must therefore be used. The occlusion of the cheek teeth rectifies itself post-operatively when the lowers drift mesially, following the incisors.

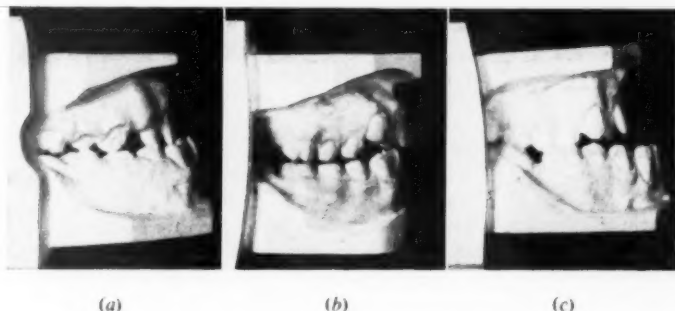


Fig. 11. Models of case showing relapse after early treatment: (a) at age 12 pre-operative; (b) at age 12½ post-operative; (c) at age 15.

It will be remembered that in two cases the relapse was due not to tooth movement but in fact to bony change. These cases were sliding osteotomies on children aged 13 years. In both cases the inherent growth pattern appears to have re-established the endogenous mandibular morphology, with a complete return to the normal skeletal pattern for that individual. This is analogous to the "growing out" of deformities produced by mal-union of other bones in children (Fig. 11).

The fourth and last complication which has given any serious concern is persistent anaesthesia of the lower lip. This is a not infrequent complication of blind slides done by the Kostecka method. Five of the 12 fully recorded cases of this type had either complete or partial anaesthesia of the lower lip of over three years' duration. It is due either to the line of section being too low or to the seeker not being introduced in sufficiently

close apposition to the bone. It is preceded by a not infrequently troublesome haemorrhage at the time of operation, which is extremely difficult to control.

Anaesthesia also follows osteotomies in which the technique does not include a preliminary removal of the neurovascular bundle from the mandibular canal. The often expressed opinion that this anaesthesia usually recovers has not been borne out in my cases. Not only has complete anaesthesia persisted in several cases, with paraesthesia in many others, but two cases, both osteotomies, developed an extremely painful causalgia. This complication has been completely eliminated by dividing the ascending ramus under direct vision in slides, and by removal of the nerve from the canal prior to section of the bone in osteotomies. This considerably increases the operating time, but results in an intact nerve and anaesthesia from stretching of only short duration.

A preliminary assessment of these cases on purely clinical evidence was carried out some years ago and the relative merits and demerits of the three main operative sites assessed as follows.

1. Ascending ramus slides

Pro

A short, relatively easy procedure.
Pre-operative planning easy.
Minimal scarring.

Contra

Frequent occurrence of anterior open bite.
Frequent damage to mandibular nerve.
Danger of delayed or non-union owing to poor apposition of fragments.

2. Body osteotomies

Pro

Accurate re-position of anterior fragment possible.
No anterior open bite if planning and execution correct.
No permanent anaesthesia.
No displacement of attachments of elevators of mandible.

Contra

Facial scar.
Occasional delayed union, probably on account of opening into mouth.
Necessity for extraction and reduction in number of functioning teeth in many cases.
Increased length of operation.
Tendency to formation of submandibular "double chin".

3. Angle osteotomies

<i>Pro</i>	<i>Contra</i>
Excellent occlusal relationship without loss of teeth obtainable.	Facial scar.
Reasonably rapid uncomplicated union.	Inability for occlusal reasons to correct anterior open bite in all cases.
Good mandibular and soft tissue contour.	Slightly increased time of immobilization relative to the body osteotomy.
	Increased length of operation.

Conclusions

The conclusions reached from this assessment were as follows:—

1. The blind ascending ramus slide by the Kostecka method is a poor operation and should never be employed in view of the uncertainty of obtaining a good result and the possible complications.

2. It would appear that an open slide with wiring of the fragment is a reasonable procedure when there is an adequate pre-operative incisor overlap and the width of the ascending ramus is such as to permit adequate apposition of the bone ends at the fracture line. When the ramus is narrow, or the degree of prognathism high, this may not be possible by means of a simple slide.

3. The ultimate prognosis and slight difference between time of union in angle and body osteotomies is so slight that it can be ignored. The choice between these two procedures therefore must depend entirely upon the ultimate occlusal result obtainable.

4. When the lower arch is intact an angle osteotomy is preferable when the occlusion permits reduction of the anterior open bite. The extraction of teeth necessary for a body osteotomy tends to prejudice the ultimate occlusal result.

With modern techniques of skin closure scarring is minimal. The need for an external approach has not therefore been considered in assessing the relative merits of the different operations.

Appendix

Ascending ramus slides subsequent to this assessment were carried out only upon cases with a reasonable incisor overlap relative to the degree of prognathism. The operation was carried out under direct vision with wiring of the fragments in apposition after reduction of the prognathism.

By doing this good occlusal results were obtained at the time of operation. It was still found, however, that intermaxillary fixation had to be maintained for three months to prevent the occurrence of an anterior open bite. This was attributed to the pull of the elevator muscles at the angle and ascending ramus. It was thought that there might be possible explanations for the ultimate stability of these cases.

- (1) Adaptation of the muscles to their new increased lengths and altered direction of pull.
- (2) More probably an actual shift of the muscle attachment to the mandible. This is comparable to the shift of muscle attachment which occurs during the growth of the mandible.

It was therefore decided that by elevating the periosteum and freeing the mandibular attachments of the masseter and internal pterygoid muscles, reattachment in new position would take place and the time of immobilization consequently reduced. This in fact has been borne out and ascending ramus slides carried out in this manner have united with no tendency to anterior open bite in about six weeks. Not only this, but the complete freeing of the angle of the mandible in this way facilitates the repositioning of the distal fragment without any tension whatsoever, even when a pre-operative slight anterior open bite was present. This explains the excellent results obtained by the Obwegeser technique, in which complete freeing of the ramus and angle is absolutely unavoidable.

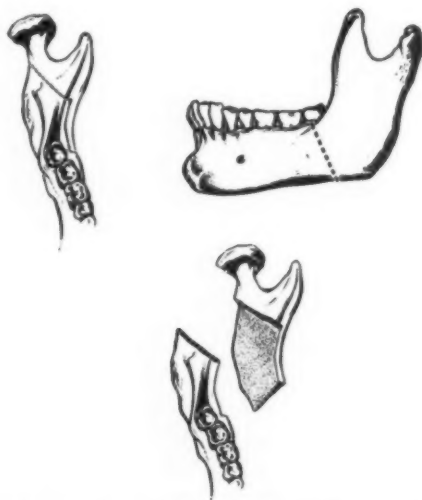


Fig. 12. Line drawing to illustrate principle of the Obwegeser sliding osteotomy.

SURGICAL TREATMENT OF MANDIBULAR PROGNATHISM

In this operation the inner plate of the ascending ramus is divided horizontally above the mandibular foramen. The outer plate is divided at the angle or even mesially to this. These bony incisions are joined along the anterior border of the ascending ramus, which is then split in the antero-posterior plane between them with an osteotome. This gives two wide opposing surfaces of cancellous bone in excellent apposition after reduction of the deformity. It is therefore particularly suitable in cases in which, owing to a narrow ramus or an extreme degree of prognathism, a straightforward slide will give insufficient bony apposition (Fig. 12).

There is, however, a limit to which an anterior open bite can be reduced by an ascending ramus slide. However much the angle and ramus are freed the speno-mandibular ligament appears to prevent downward displacement of the mandibular foramen unless sufficient distal movement also is obtained to relieve any tension upon it. This can be determined accurately by means of a lateral skull radiograph.

The conclusions already arrived at have therefore been tentatively modified as follows:—

1. A blind ascending ramus slide is a bad operation for the following reasons:

- (a) The distal fragment is not controlled and there may be complete lack of apposition with non-union.
- (b) Adequate stripping of muscle and other attachments cannot be carried out. All cases treated in this way having non-union or delayed union were seen on X-ray to have poor bony apposition (Fig. 9 (d)).
- (c) Damage to the mandibular nerve is common.
- (d) Severe haemorrhage, difficult to control, may occur at the time of operation.

2. An open ascending ramus slide is a good operation providing that:

- (a) Adequate fixation of fragments is obtained.
- (b) The angle and ascending ramus are completely freed from all attachments below the lingula so that the distal fragment can be repositioned without tension.
- (c) There is not an anterior open bite of such degree that tension on the speno-mandibular ligament will prevent its closure.
- (d) The final occlusal result is at least as good as can be obtained by any other method.

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The extra-oral approach to the ascending ramus is difficult owing to the proximity of the facial nerve. The intra-oral approach is, however, quite simple and fixation by sigmoid notch wiring straightforward.

It was not until I was well advanced with my assessment of these cases that my views on open ascending ramus slides became modified. I have not yet done a sufficient number of these cases to form other than tentative conclusions, but I feel that this lecture would not be complete without at least this mention of my most recent work.

In conclusion I must again thank Mr. C. Bowdler Henry for allowing me access to his cases and Mr. Richard Battle for his helpful advice and encouragement. Also I owe much to personal communications from many of my colleagues, especially Mr. Fickling, Mr. Fordyce and Mr. Rowe. Last but not least I must acknowledge the great help received from the photographic and X-ray departments of the Royal Dental Hospital and St. Thomas's Hospital and of numerous registrars and housemen who have assisted me in this work.

I consider it a great honour to have been selected for this lecture and I wish to thank the Council of the College for so doing, and also all present this evening for having come to hear it.

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ARTERIAL EMBOLISM IN THE LOWER LIMBS

Hunterian Lecture delivered at the Royal College of Surgeons of England

on

28th April 1960

by

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INTRODUCTION

SINCE WILLIAM HARVEY published *De Motu Cordis* in 1628 the pathology and physiological effects of arterial occlusion became of increasing interest. As early as 1793, John Hunter described a case of gangrene of a leg resulting from arterial thrombosis. Although many instances of emboli originating from the left side of the heart were described, it was left to Virchow (1854) to make the first adequate description of the pathology of embolism. In recent years most writers on peripheral arterial embolism have confined their attention to the lower limbs, as upper limb embolism constitutes neither a diagnostic nor a therapeutic problem. The history of arterial embolism in the lower limbs is a depressing catalogue of *mors* and mortification. This report is of 210 patients with 270 incidents of lower limb embolism. It is mainly concerned with the 179 patients with 235 lower limb emboli who were treated conservatively. For purposes of comparison 31 patients who had 35 lower limb embolectomies are also reported.

The majority of the patients have been admitted to the Manchester Royal Infirmary over the past 12 years. Some were seen in other Manchester hospitals, notably Crumpsall Hospital.

SITE OF IMPACTION OF EMBOLI

Table I lists the incidence of embolic impaction at the various sites in the lower limb in this series.

The few external iliac emboli have been grouped with those of the common femoral artery; similarly, the few posterior tibial emboli have been included with the popliteal emboli. There is in this series a notably high incidence of aortic "saddle" emboli as compared with those of other

TABLE I
SITES OF IMPACTION OF 270 EMBOLI

Aortic bifurcation	..	..	..	22%
Bifurcation of common iliac artery	..	..	..	7%
Bifurcation of common femoral artery	..	..	..	45%
Superficial femoral artery	..	..	..	7%
Popliteal artery	..	..	..	19%

writers, e.g. 4.5 per cent. in 336 lower limb emboli of a collected Swedish series (Key, 1936), 10 per cent. in Haimovici's 277 emboli (1950), and 7 per cent. in Jepson's 97 lower limb emboli (1955). A recent review of over 2,000 emboli from the literature found an incidence of aortic emboli of 6 per cent. (McGarity *et al.*, 1958).

However, a similar high proportion of aortic emboli, namely over 20 per cent. of all lower limb emboli, was found in a review of 393 peripheral emboli in patients with rheumatic heart disease (Daley *et al.*, 1951).

Not infrequently a history is obtained suggesting that the embolus impacts at the bifurcation of the aorta for anything from a few minutes to an hour or two, prior to slipping down one or both legs. This was the

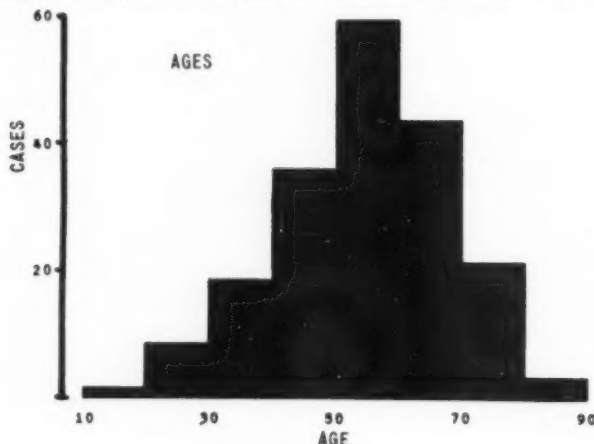


Fig. 1. Age incidence of cases.

case with 20 patients who gave a history of preliminary severe lower abdominal pain associated with a desire to defaecate. Half of these developed bilateral leg emboli within a matter of one hour; in the others one leg only was eventually affected. One patient was taken to the operating theatre with a confident diagnosis of aortic "saddle" embolus, but by the time the aorta was explored the embolus had broken up and slipped down into both common femoral arteries. The emboli in this series have been classified according to their site of final impaction.

AGE INCIDENCE

The ages of the patients range from 17 to 83 years. Embolism occurred principally in the fourth, fifth and sixth decades (Fig. 1). 86 per cent. are 40 years of age or over. This incidence is much the same as in other large series.

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SEX INCIDENCE

66 per cent. of the patients were females, and 34 per cent. males. This is a rather higher proportion of females than in most other reported series.

SOURCE OF EMBOLI

The source of the emboli in at least 90 per cent. of the patients was the left side of the heart. Auricular fibrillation was present in 70 per cent. and was associated with rheumatic or degenerative myocarditis or with a recent myocardial infarct. 54 per cent. of the patients in this series had mitral stenosis. Arterio-sclerotic auricular fibrillation was present in 17 per cent. and recent myocardial infarcts in 15 per cent. Three patients had subacute bacterial endocarditis, one with a large aortic "saddle" embolus, another with a common femoral embolus, and a third with a popliteal embolus. In only one case was auricular fibrillation due to thyrotoxicosis (Table II).

TABLE II
SOURCE OF EMBOLI

CARDIAC 90%	Auricular Fibrillation (70%)	<ul style="list-style-type: none"> { Rheumatic heart disease 54% { Degenerative heart disease 17% { Myocardial infarction 15% { S.A.B.E. { Thyrotoxicosis
OTHERS 10%	<ul style="list-style-type: none"> { Aortic <ul style="list-style-type: none"> { atheroma { aneurysm { suture line { Pulmonary veins (Paradoxical emboli) { Undetermined 	

Mural thrombus formed on a myocardial infarct is a common and frequently unsuspected source of emboli. Haimovici (1950) stresses that myocardial infarction is the second leading cause of embolism and in his series it was responsible for 31.5 per cent. of peripheral emboli. 11 per cent. of the infarcts in his series were "silent". In this series as many as one third of the myocardial infarcts were "silent", the first symptom being a peripheral embolus. The infarct, unsuspected clinically, was found either at autopsy or during life on an electrocardiogram ordered to elicit the nature of some cardiac irregularity. This mode of presentation of "silent" myocardial infarction by peripheral arterial embolism has recently been entitled the "cold foot syndrome". Frank (1959) reported three such "silent" infarcts presenting during post-operative convalescence with lower limb embolism five to 13 days after operation.

In most series there are some 10 per cent. of peripheral emboli, the source of which is never determined. Of the non-cardiac sources the aorta is the most common. Mural thrombosis in an atheromatous aorta was considered the source of embolus in several patients in this series.

It is anticipated that such emboli will increase in frequency as more direct surgery on the aorta is performed. Two patients in this series developed lower limb emboli following aortic operations, one of disobliteration of a thrombosed aorta, the other of resection and grafting of an aortic aneurysm. Another recognized extra-cardiac source of peripheral emboli are the pulmonary veins. Two patients developed large aortic "saddle" emboli a few days after pneumonectomy for carcinoma of the bronchus. In neither patient was there any cardiac disease. There were no definite cases of paradoxical emboli in this series.

PHYSIOPATHOLOGY OF EMBOLISM

The effect of a sudden occlusion of the lumen of a major limb vessel is to produce a marked pallor of the limb as a result of emptying of the arterioles and smaller vessels. The skin pallor is associated with numbness, sometimes paraesthesiae, and, to a lesser extent, motor paralysis. These signs of ischaemia are invariably distal to the site of occlusion. If such a limb is exposed, the skin temperature falls and approximates to that of its surroundings, developing what has aptly been called a "*froid cadavérique*".

Arterial spasm

These marked features of ischaemia distal to the occlusion have usually been ascribed to arterial spasm. More recently doubts have been expressed concerning the evidence for arterial spasm as an important concomitant of arterial embolism. Undoubtedly the artery distal to the embolus is collapsed, but this effect is readily explained by the physiological reaction of the vessel walls to the lowered pressure within the lumen. Many of the examples of vasospasm can be explained by the impaction of emboli in proximal vessels and their later disintegration and migration to more distal sites, often with improvement in the ischaemia of the limb. Such cases were not infrequent in this series, and have been mentioned already in connection with aortic "saddle" emboli. However, arterial spasm can and does occur in arterial embolism. Most surgeons will have observed the spasm of the artery which may occur with the operative trauma of embolectomy. There are also cases which would be difficult to explain without postulating arterial spasm. Such cases may present with a history of the sudden onset of numbness, intense pallor, some paralysis, and the absence of distal pulsations and oscillations in a limb, and within a matter of two or three hours the limb is again warm and symptom free. It would seem that emboli too small in themselves to produce complete occlusion of a major limb artery might well initiate widespread vasospasm simulating complete arterial obstruction. Such emboli merit Fiolle's (1938) term "lost" (*manquée*) emboli.

Secondary thrombosis

Changes in the intima occur with the impaction of an embolus causing the clot to adhere to the vessel wall. In addition, secondary or consecutive thrombosis in the artery distal to the embolus may occur and may interfere with the collateral circulation. It seems more likely that such secondary thrombosis results from the failure of the collateral circulation to open up adequately, rather than the other way round.

Concurrent venous thrombosis may also occur and is commonly present in the gangrenous limb. The early appearance of deep venous thrombosis in an ischaemic limb inevitably suggests a poor prognosis for the limb.

Collateral Circulation

Upon the collateral circulation depends the fate of the ischaemic limb. The mouths of the collaterals may be blocked by the extension of secondary thrombus, or, it is postulated, be involved in generalized vasospasm. More important factors appear to be anatomical deficiencies in the collateral circulation at various sites and the blocking of the mouths of the collateral channels by atheromatous deposits. The opening up of the collateral circulation in response to the local ischaemia in the limb depends on the functional capacity of the heart and on the local condition of the vessels. The combination of a failing myocardium and arteriosclerotic peripheral vessels, so commonly seen in cases of lower limb embolism, will probably seal the fate of an ischaemic limb.

Effect of relieving arterial occlusion

An unusual effect of the relief of acute arterial occlusion was reported by Glen (1941). A patient had a traumatic central dislocation of the hip producing complete occlusion of the external iliac vessels without damaging them. Relief of the obstruction produced sudden and profound collapse of the patient. His condition improved with re-application of pressure to the vessels effecting a gradual and intermittent release of pressure. The patient died four days later and histology of the kidney showed an appearance similar to that described in crush injuries. Guthkelch (1943) reported a patient who developed anuria like that of the "crush syndrome" a few days after embolectomy. It is possible that this apparently unusual sequel to embolectomy may be the cause of some of the mysterious deaths which follow within a few days of embolectomy. It is otherwise difficult to account for the higher mortality of operative compared with conservative treatment of lower limb embolism, even when with minimal disturbance of the patient the operation is performed under local anaesthesia.

FACTORS PREDISPOSING TO EMBOLISM

At one time it was thought that undue exertion might predispose to peripheral embolism in patients with cardiac disease. There was no evidence to support such a view in this series, thus confirming the findings of other writers (Sprague and Westinghouse, 1941; Bourne, 1950; Jacobs, 1959). What has been very striking in this series is the frequency with which embolism occurred whilst the patient was in bed. Often the patient awakened in the night to find his leg numb and cold. A large number were at the time confined to bed at home for the treatment of congestive heart failure or a recent myocardial infarct. Over half of the embolic incidents reported here occurred whilst the patient was in bed. 35 per cent. of Daley and others' cases had congestive heart failure at the time of embolism. These findings do not accord with the views of Bourne (1950) that embolism is not normally due to clot formation in the dilated auricle of severe congestive heart failure but is more common in patients whose exercise tolerance is good. When the embolism occurred in hospital the patient had usually been admitted to the medical wards for treatment of some cardiac disorder. In some cases embolism occurred during the post-operative confinement to bed following such operations as cataract extraction, removal of a perforated appendix, radical mastectomy, gastro-enterostomy, and laparotomy for acute pancreatitis. Again this finding does not accord with the contention of Daley and others (1951) that operations bear no relation to the occurrence of embolism. Only two of this series of lower limb emboli occurred during the operation of mitral valvotomy.

Frequently the history preceding embolism was of a recent onset of cardiac irregularity or the change to a rapid uncontrolled auricular fibrillation or the occurrence of a transient auricular flutter. On the other hand, some of the cases of mitral stenosis had normal sinus rhythm at the time of embolism. No definite relation between embolism and the exhibition of digitalis or quinidine could be established in this series.

DIAGNOSIS

It is usually a fairly simple matter to diagnose a spontaneous arterial occlusion in a lower limb, and from a practical point of view the cause is either thrombosis or embolism. To be any more precise than this in the diagnosis is often difficult. Griffiths (1938), speaking of embolic arterial occlusion, says that the "diagnosis is usually absurdly easy". Many other writers, however, have reported considerable difficulty in distinguishing embolic from thrombotic occlusion (McKechnie and Allen, 1935; Leriche, 1938; Pratt, 1942; McClure and Harkins, 1943; Warren and Linton, 1948).

The features of acute arterial occlusion are found in both embolism and acute thrombosis. The signs of blanching and cooling of the limb,

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together with motor and sensory loss, absence of peripheral pulses, and later blotchy colour changes occur in both embolism and thrombosis. Similarly the symptoms of pain, paraesthesiae, numbness, coldness and loss of power in the affected limb are merely symptoms of arterial occlusion. No one or a combination of these signs and symptoms serves to differentiate embolic from thrombotic occlusion. It is often taught that severe pain and the sudden onset of symptoms are almost pathognomonic of embolism. Pain is an initial symptom of peripheral embolism in less than 60 per cent. of cases (McKechnie and Allen, 1935). Many of the patients reported in this series had no pain at all, or had a very gradual progression of symptoms. Often the patients' first intimation of anything amiss was a slowly progressive weakness or numbness of the leg. Not infrequently an embolus may lodge without the patient's knowledge, without any sign or symptom (Learmonth, 1948), and only be discovered on routine examination at a later date. Such "silent" emboli formed 5.7 per cent. of Haimovici's (1950) series.

A previous history of circulatory impairment in the limbs, such as long-standing numbness, coldness or intermittent claudication is in favour of arterial thrombosis. Examination of the unaffected limb may reveal evidence of prolonged vascular insufficiency, such as loss of hair, deformity of the nails, dry glossy skin, atrophy of the fat pads of the toes, muscle wasting, increased venous filling time, positive Buerger's test, absence of reflex vasodilatation, and radiological evidence of calcification of the vessel walls or rarefaction of the skeleton. All these are evidence of peripheral vascular disease and favour a diagnosis of arterial thrombosis. The diagnosis of embolism requires the presence of a source of emboli and this may necessitate an electrocardiogram to exclude "silent" cardiac infarction. Multiple incidents are in favour of embolism. The age of the patient is not very helpful as both embolism and thrombosis are most common after the age of 40 years.

Use of oscillometry

Oscillometry is an invaluable aid to the diagnosis of an arterial block, and helps considerably in elucidating the nature of the disease. Palpation of the peripheral pulses in the lower limbs is not always easy, especially in the obese. The difference between observed absence of oscillations and absence of peripheral pulses is the difference between certainty and doubt. The oscillometer provides two very useful findings, the presence or absence of peripheral arterial disease, and the level of the block. The site of the block is most useful in the diagnosis as approximately one half of the lower limb emboli impact in the common femoral artery, a most unusual site for thrombosis.

Use of arteriography

An arteriogram provides an extremely precise method of ascertaining the degree of any arterial disease which may be present, and the only really exact method of diagnosing the level of occlusion. As such it is an invaluable aid in the differentiation of acute arterial thrombosis from embolism. In embolism uncomplicated by arterial disease, the main artery is essentially normal and gives off collaterals with a normal pattern and a straight course. The opaque medium fills the artery as far as the point where it is suddenly arrested by the occluding embolus. Frequently

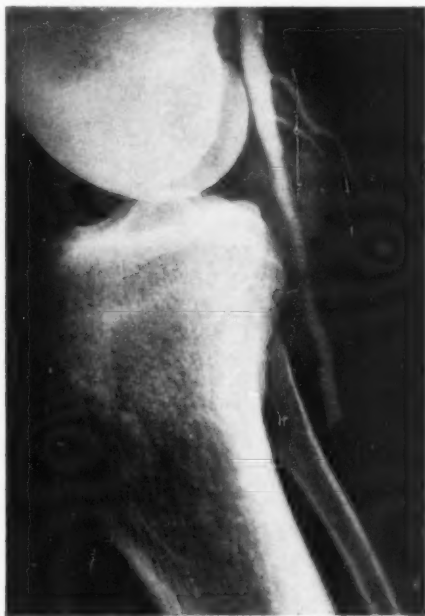


Fig. 2. Arteriogram demonstrating embolic arterial occlusion.

the block is not straight as if cut off by a knife (Fig. 2), but the opaque medium flows a little around the periphery of the embolus giving a dome-shaped ending to the block (Fontaine and Branzeu, 1939).

The arteriogram in peripheral arterial disease with acute thrombosis is entirely different. Here the main vessel is not normal; it may be narrowed and is often tortuous, and irregularity of its walls above the block gives ample evidence of diffuse arteritis. The level of the block is usually shown by a straight line as if the artery had been cut through with a sharp knife (Fig. 3). Depending on the duration and severity of the arterial disease

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the collaterals will be numerous, tortuous and spiral. The patient whose arteriogram is illustrated in Figure 3 was a man of 45 years of age with mitral stenosis and auricular fibrillation who developed sudden numbness of his calf and foot associated with blanching and loss of power in the limb. He had no previous history to suggest the presence of peripheral vascular disease, but oscillometry revealed a complete block of popliteal artery in the affected limb and also uniformly reduced oscillations in the opposite leg. The arteriogram confirms the diagnosis of diffuse obliterative arteritis with secondary popliteal thrombosis.



Fig. 3. Arteriogram demonstrating thrombotic arterial occlusion.

PRINCIPLES OF CONSERVATIVE MANAGEMENT

The conservative treatment practised in this series consists essentially of the logical management of an ischaemic limb, together with the avoidance of any harmful measures (Boyd, 1950). The two most harmful measures, and those most likely to seal the fate of an ischaemic limb, are the local application of heat and the elevation of the limb. The ischaemic limb is kept exposed at a temperature of approximately 80° F. The leg is nursed in a slightly dependent position relative to the heart by raising the head of the bed on five-inch blocks. The rest of the patient's body is warmed with a view to inducing reflex vaso-dilatation. More exotic

physio-therapeutic measures aimed at stimulating the circulation, such as the Matos compressor, intermittent venous occlusion including the Pavaex boot apparatus and the Sanders oscillating bed, were not used in any of these cases.

In addition certain specific adjuvant measures were used, the most frequently employed being systemic vasodilator drugs, systemic anticoagulants and paravertebral sympathetic block. Occasionally alcohol by mouth was used, usually in the form of brandy. Unfortunately, any one or a combination of these measures were employed relatively indiscriminately and it has been impossible to make any really objective assessment of their effects. More rarely proximal intra-arterial injections of "Priscol", eupaverine hydrochloride or heparin were also used. For post-embolic ischaemia lumbar ganglionectomy was performed on occasions.

As well as attention to the local circulatory state of the affected limb, measures directed towards the patient's comfort and his general circulatory state are of paramount importance. The relief of pain and ensurance of adequate sleep are easily overlooked in the eager search for better methods of improving the circulation of the limb. In addition heavy sedation is useful in achieving a release of sympathetic vaso-constrictor tone. Uncontrolled auricular fibrillation and congestive heart failure require as urgent treatment as the ischaemic limb. The maintenance of the blood pressure is vital for the survival of the limb as well as that of the patient. It is not uncommon for gangrene to supervene rapidly in a limb already recovering from embolic ischaemia, when hypotension accompanies an extension of a myocardial infarct which was the source of the embolus. So dramatic is the effect of such hypotension that further limb embolism may be mistakenly diagnosed.

Of the three most commonly used adjuvants in the conservative management of lower limb embolism, vasodilator drugs, anticoagulants and paravertebral sympathetic block, the impression gained was that the last named was the most efficacious. There seems no doubt that post-embolic ischaemia is improved considerably by lumbar ganglionectomy and by paravertebral sympathetic block with a saturated solution of phenol (chemical sympathectomy). Most patients in the acute stage of lower limb embolism are too ill to permit lumbar ganglionectomy, but paravertebral block with phenol is readily performed without moving the patient from the bed. Clinically this simple procedure reduced any arterial or venous spasm which was present, alleviated pain and assisted the collateral circulation in the limb. Unfortunately, the majority of these patients (86 per cent.) are 40 years of age or more, and concomitant arteriosclerotic changes in the vessels of the lower limbs may prevent the collateral circulation opening up adequately. The experiments of Jacobs (1959) showed

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that there was considerable variation in the degree of anatomical development of arterial collaterals in different persons, especially in the lower limbs. Deficiencies in the collateral field of the common femoral artery were common, whereas in those of the brachial and popliteal arteries they were rare.

Unlike the findings of Des Prez and Hubay (1953) this series afforded no convincing evidence of improvement by the exhibition of anticoagulant drugs. Autopsy findings of consecutive thrombosis and clinical evidence of further embolism while under apparently adequate anticoagulant treatment were not infrequent. On theoretical grounds systemic vasodilator drugs seem unlikely to have much effect unless given in such doses as to produce hypotension and thus vitiate any effect on the ischaemic limb. Certainly no real evidence of their efficacy has been found in this series and it was noted that they are commonly administered in what are virtually homeopathic doses.

RESULTS OF CONSERVATIVE MANAGEMENT

By conservative management in this series is meant non-operative management. This includes no treatment at all as well as measures that could not fail to produce gangrene, such as local heating or elevation of the limb, tight bandaging and massage. The results of treatment are analysed with regard to the fate of the patient as well as the fate of the limb.

Mortality

The overall mortality for the conservatively managed patients was 35 per cent. This figure covers all those patients dying in hospital and includes those admitted in a moribund state and dying shortly after admission, as well as those dying many months later after amputation. Only those patients who were discharged alive and well to their own homes were regarded as surviving, and these constitute nearly two-thirds of the cases. A more detailed study of the fatal results is made later.

Gangrene rate

There were 235 lower limb emboli conservatively managed and of these less than one-third developed gangrene. Included in this figure are those admitted with frank gangrene. The remaining limbs either recovered or were recovering at the time of the patient's death (Table III). Some of

TABLE III
RESULTS OF CONSERVATIVE MANAGEMENT
179 patients with 235 lower limb emboli.
Mortality 35%
Total Incidence of Gangrene 31%.

course recovered, but persistence of ischaemic symptoms required their eventual amputation many months or even years later. The common sites of embolic impaction in the lower limb are now analysed separately.

Aortic "saddle" emboli

There were 47 patients with "saddle" emboli (94 ischaemic limbs) in the conservative series. The mortality was 47 per cent. in this group. Although this is a high death rate it compares favourably with that of embolectomy. The total incidence of gangrene in the 94 limbs was 29 per cent.; and if those admitted with frank gangrene are excluded, this figure falls to 25 per cent. (Table IV). Of those patients who left hospital alive,

TABLE IV	
AORTIC "SADDLE" EMBOLI	
Mortality 47%	Gangrene Rate 29%
Four-fifths of the survivors are discharged with both limbs intact.	

80 per cent. were discharged with both limbs intact; in the remainder, either one or both limbs developed gangrene. However, the majority of the surviving patients, although escaping gangrene and amputation, continued to be troubled with post-embolic ischaemia in the form of claudication, coldness, paraesthesiae, ulceration of the feet, foot drop and occasionally ischaemic muscle necrosis.

Common iliac emboli

In this group there were 18 patients with 19 emboli treated conservatively. The mortality was 39 per cent. Of the 19 ischaemic limbs four were admitted with gangrene and a further six developed gangrene, giving an overall gangrene rate of approximately 50 per cent. The remaining limbs recovered or were recovering at the time of death. In

TABLE V	
COMMON ILIAC EMBOLI	
Mortality 39%	Gangrene Rate 50%
Three-fifths of the patients survive and of these one-third develop gangrene.	

this group (Table V) three-fifths of the patients survive and of these one-third go on to gangrene and amputation. Post-embolic ischaemia was unusual in the surviving limbs and no late amputations had to be performed.

An unusual feature in this series of common iliac emboli is that the left-sided emboli were three times as common as right-sided. This is in contrast to the lower reaches of the vascular system, where the emboli were evenly distributed on either side. This may be due to the less oblique course of the left common iliac artery—the larger emboli going down this side—the smaller going down either side.

ARTERIAL EMBOLISM IN THE LOWER LIMBS

Common femoral emboli

In this group there were 85 patients with 103 emboli treated conservatively. The mortality was 36 per cent. and the overall gangrene rate 39 per cent. If those admitted with frank gangrene are excluded then this figure falls to 25 per cent. (Table VI). Nearly two-thirds of the patients

TABLE VI
COMMON FEMORAL EMBOLI

Mortality 36%	Gangrene Rate 39%
Nearly two-thirds of the patients survive and of these less than one-fifth develop gangrene (excluding those admitted with frank gangrene).	

survived and of these one-quarter developed gangrene—if those admitted with frank gangrene are excluded the gangrene rate in the survivors is 18 per cent. The incidence of post-embolic ischaemia, however, is fairly high, the most affected patients being those who had had previous emboli in the same limb.

Superficial femoral emboli

In the conservatively managed series there were only 17 superficial femoral emboli. There were no deaths. Only two limbs developed gangrene but five others had late ischaemic symptoms.

Popliteal emboli

There were 43 patients with 51 popliteal emboli. The mortality rate was 10 per cent. and the incidence of gangrene also 10 per cent. Post-embolic ischaemia was noted in approximately one-third of the patients discharged without amputation. It is evident that popliteal and superficial femoral emboli do not constitute any problem. The problem is entirely with aortic, iliac and common femoral emboli.

ANALYSIS OF FATAL CASES

Age

Previous reports have claimed that age is not a determining factor in the prognosis (Haimovici, 1950). In this series over 77 per cent. of the deaths occurred in patients of 50 years or over (Fig. 4), whereas this group accounts for only 66 per cent. of the admissions. The death rate for each decade rises rapidly at 60 years and over, when it is 50 per cent. (Fig. 5).

Sex

23 per cent. of the fatal cases were men and 77 per cent. women. There is evidently a higher death rate amongst females (who constitute 66 per cent. of the admissions), partly due to a higher incidence of females in the

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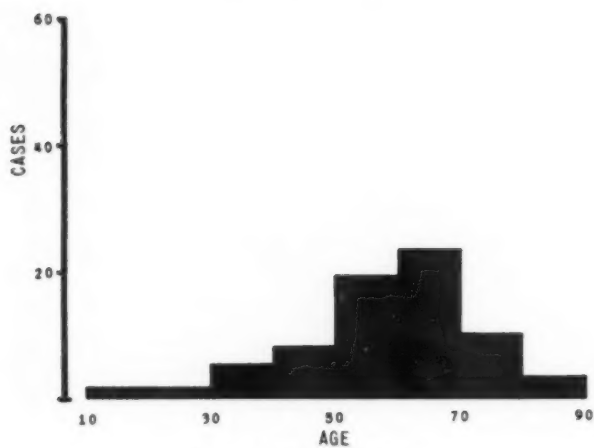


Fig. 4. Ages of fatal cases.

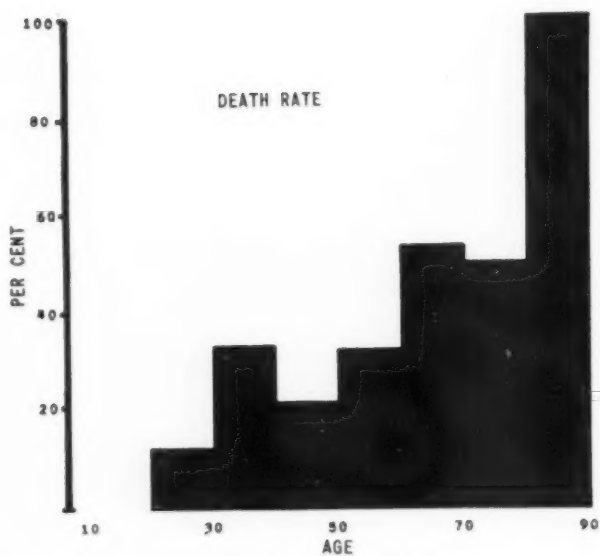


Fig. 5. Death rate for each decade.

ARTERIAL EMBOLISM IN THE LOWER LIMBS

older age groups and partly due to a greater preponderance of females in those patients with severe mitral stenosis and heart failure.

Sites of impaction

Table VII shows the death rate according to the site of impaction of the emboli.

TABLE VII
DEATH RATE ACCORDING TO SITE OF IMPACTION OF EMBOLI

	<i>Incidence of Emboli</i>	<i>Death Rate</i>
Aortic bifurcation	22%	47%
Bifurcation of common iliac ..	7%	39%
Bifurcation of common femoral ..	45%	36%
Superficial femoral	7%	0%
Popliteal	19%	10%

As has already been noted, the main problem, both as regards mortality and incidence of gangrene, is with the proximal limb emboli, aortic, iliac and common femoral.

Effect of multiple emboli

Almost 40 per cent. of all the patients in this series suffered more than one separate incident of peripheral embolism. Of these patients with multiple emboli 57 per cent. died as a result of one of the embolic incidents. Upper limb embolism occurred in 15 per cent. of the whole series of 210 patients. Cerebral embolism was the probable cause of death in over 45 per cent. of the fatal cases.

Autopsies were conducted in 83 per cent. of the fatal cases. Visceral embolism as evidenced by old or recent infarcts was found to be much more commonly present than was suspected clinically (Table VIII).

TABLE VIII
THE INCIDENCE OF VISCERAL EMBOLI IN FATAL CASES

Renal	53%	(usually multiple)
Cerebral	45%	
Splenic	33%	(frequently multiple)
Pulmonary	25%	(occasionally multiple)
Mesenteric	14%	
Retinal	3%	
Hepatic	rare	
Cardiac	rare	

There was only one definite hepatic infarct in this series. In one case the finding of occlusion of the left coronary artery in a fatal case of multiple embolism was regarded as embolic in view of the absence of disease of the vessel walls.

Nature of primary disease

When the three main cardiac conditions leading to peripheral embolism are examined for their death rates there is no significant

difference in the number of deaths in each group. There is, however, a higher incidence of aortic "saddle" emboli in the fatal cases of rheumatic heart disease than in the non-rheumatic cases (Table IX).

TABLE IX

	NATURE OF CARDIAC DISEASE		
	% admissions	% all deaths	% "saddle" embolus
Rheumatic	54%	56%	50%
Arteriosclerotic	17%	14%	27%
Coronary	15%	16.7%	15%

It might be anticipated that rheumatic heart disease with peripheral embolism would carry a poorer prognosis than non-rheumatic heart disease and embolism. This is not the case. When the largest single group of emboli, namely the common femoral emboli, are analysed the mortality of the rheumatic group is one-third as compared with a half for the non-rheumatic group.

RESULTS OF EMBOLECTOMY

Although the operation of arterial embolectomy has been practised for over fifty years the results do not show the improvement that might be expected to follow the advances in medical knowledge, surgical technique or the introduction of vasodilator and anticoagulant drugs. The first successful arterial embolectomy in Britain was reported by Jefferson of Manchester in 1925 and he re-introduced the operation into this country, where it had largely been forgotten following the unsuccessful attempts of Sampson Handley and Moynihan (1907). Incidentally, Jefferson performed the first successful aortic embolectomy in this country (Griffiths, 1938).

It is a never-failing source of wonder that, with so few worthwhile results available in the large number of published embolectomies, the operation is still as widely practised as it is. It is only fair to assume that the unpublished results are no better. As Flasher and Stephenson (1952) have pointed out, the constant repetition of the opinion that embolectomy has everything to gain and nothing to lose does not in itself constitute a proof of that opinion. Their mortality for embolectomy was 70 per cent. and it must be borne in mind that any group of embolectomies is made up of the "better risk" cases and usually those admitted within a few hours of embolism occurring. It is a matter of considerable difficulty to calculate the true mortality for lower limb embolectomy in most reported series. This is because the results are frequently diluted with upper limb embolectomies. In some papers the mortality is expressed as a fraction of the number of operations performed rather than of the number of patients. Other authors claim that the operation was successful, but death occurred "from unrelated causes". Allowing for these difficulties all large series

ARTERIAL EMBOLISM IN THE LOWER LIMBS

show a mortality of at least 50 per cent., and most of them 60 per cent. and over (Danzis, 1933; Key, 1936; Reynolds and Jirka, 1944; Haimovici, 1950).

Haimovici states that to render a conservatively treated series comparable with surgically treated ones it is necessary to exclude all "silent" emboli from the conservatively treated. There were no "silent" emboli amongst those reported here. In this series a total of 35 embolectomies were performed on 31 patients. Over two-thirds of the patients died whilst still in hospital. In the embolectomy group, counting two limbs per saddle embolus, there were 48 limbs to assess. The majority of the fatal cases died less than forty-eight hours after the operation and there were two deaths on the operating table. Thus many patients died too soon for the effect of the operation on their ischaemic limbs to be assessed. However, six limbs developed frank gangrene, giving a gangrene rate of at

TABLE X
RESULTS OF EMBOLECTOMY
(31 patients)

	Operations	Deaths	Limbs	Gangrene Rate
Aortic "saddle"	.. 13	8	26	3
Common iliac	.. 2	2	2	0
Common femoral	.. 16	9	16	1
Superficial femoral	.. 2	2	2	1
Popliteal	.. 2	0	2	1
TOTALS	35	21 (68%)	48	6 (12.5%)

least 12.5 per cent. (Table X). Embolectomy with retrograde flushing via a cannula in the posterior tibial artery was performed in three cases, none of them successfully.

While it is perhaps becoming more generally recognized that the operation of embolectomy has little to offer the patient *vis-à-vis* conservative methods, it is argued that embolectomy should be performed on the more proximal vessels such as the aorta and common femoral arteries in order to lessen the incidence of post-embolic ischaemia in the survivors (Haimovici, 1950; Warren *et al.*, 1954; Jepson 1955; McGarity *et al.*, 1958; Jacobs, 1959). Indeed there are those who advocate a more aggressive approach to peripheral emboli combining retrograde flushing out of consecutive thrombus with embolectomy (Shaw, 1956; Shumacker and Jacobson, 1957; Tibbs, 1960). This technique has been applied as late as three and a half months after impaction of the embolus (Olwin *et al.*, 1953). While it must be obvious that no surgery could hope to improve on the results of non-operative treatment of popliteal and superficial femoral emboli, it is less obvious that the freedom from post-embolic ischaemia alleged to follow embolectomy justifies such a high mortality.

More detailed assessment of the limbs of those surviving embolectomy largely refutes the claim of much greater freedom from ischaemia in embolectomized limbs. Amongst the survivors following embolectomy (counting two limbs per saddle embolus) there were 15 limbs available for assessment. Of these, three went on to gangrene and amputation, and one other required amputation two years later for ischaemia. Six others had rest pain and coldness, two of them with ischaemic skin necrosis. Another three had residual oedema, one with ischaemic foot drop and another with claudication. Only two limbs were regarded as being free from ischaemic symptoms and these were both in the same patient following aortic embolectomy.

The attempt to produce useful anischaemic limbs by embolectomy loses sight of the fact that the majority of these patients are relative cardiac cripples in whom claudication or ischaemic foot drop is little added disability. As has been pointed out by others, it is important not to stare blindly at the peripheral embolism, but to remember clearly that the latter is invariably nothing less than a link in a chain of serious multiple cardiovascular sequelae, constantly threatening the life and health of the patient. While agreeing with Osler's dictum that no person should be permitted to die of one disease merely because he has another, it is stressed that 40 per cent. of these patients are subject to further emboli. Until the source of emboli can be dealt with, there seems to be little point in striving, at such high cost, to achieve a perfect circulatory state in the limbs.

PREVENTION OF EMBOLI

The future for the treatment of peripheral arterial embolism depends on the discovery of some means of dealing with their source. The use of long-continued anticoagulants is advocated in the hope of preventing the formation of intra-cardiac thrombi. There is no reason to believe that anticoagulants can materially affect thrombus already formed, and at least two patients in this series continued to have peripheral emboli whilst on an apparently adequate anticoagulant regime.

Mitral valvotomy is sometimes advised in the hope, amongst others, of preventing further emboli. Five patients in this series had 12 further peripheral emboli from a few weeks to three and a half years after mitral valvotomy. In only one case has excision of the left auricular appendage been carried out in the prophylaxis against further embolism, and so far it has been successful. There is no reason, however, why thrombus should not continue to be formed in the remaining left atrium if this continues to be the site of irregular and feeble contractions. Autopsies on 51 cases of mitral stenosis with adherent intra-cardiac thrombi at the Mayo Clinic (Jordan *et al.*, 1951) revealed that half the thrombi found on the left side of the heart were situated elsewhere than in the auricular appendage.

SUMMARY

A large series of conservatively managed lower limb emboli have been analysed.

It is suggested that aortic " saddle " emboli occur more frequently than is generally accepted. In addition, careful anamnesis suggests that in a further 10 per cent. of patients the embolus lodges at the aortic bifurcation for a short time before proceeding to its site of final impaction.

The importance of peripheral embolism as a sign of otherwise symptomless cardiac infarction is stressed. The frequency with which decubitus and post-operative convalescence is a factor in peripheral embolism is noted.

The features in the differential diagnosis of embolism are discussed and the value of oscillometry and arteriography emphasized.

The principles of conservative management are outlined and the results given in detail. Conservative management is largely the avoidance of harmful measures. The natural history of peripheral embolism, even of aortic and common femoral embolism, is such that spontaneous recovery is likely in the majority of cases and that operative intervention makes the prognosis worse.

The importance of cardiac arrhythmia in the genesis of peripheral embolism is underlined, and it is conjectured that the prognosis is unlikely to be improved until satisfactory means of dealing with this central lesion are discovered.

ACKNOWLEDGMENTS

I am grateful to the medical staff of the Royal Infirmary and Crumpsall Hospital, Manchester, for allowing me access to their cases and the use of their case notes. I am particularly indebted to Professor A. M. Boyd, at whose suggestion this work was undertaken, for his constant advice and encouragement.

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HOLIDAY LECTURES FOR SCHOOLCHILDREN

THE FOLLOWING LECTURES for schoolchildren will be delivered in the College in December. Tickets may be obtained on application to the Assistant Secretary of the College.

Thursday, 29th December.

- 3 p.m. The Romance of Surgery—"Two great observers—Lord Lister and Sir Alexander Fleming." Lecture by Sir Zachary Cope, F.R.C.S.

Friday, 30th December.

- 11 a.m. Demonstration of historical medical books and manuscripts by W. R. LeFanu, Esq., M.A., Librarian of the College (limited to 15 older children).
2 p.m. "The Biology of Twins." Lecture by Professor D. R. Newth (for older children).
4.15 p.m. Talk on "John Hunter, his experiments and his Museum" by Miss Jessie Dobson, B.A., M.Sc., A.C.I.S., Anatomy Curator, followed by a tour of the Museum.

THE LATE SIR GORDON GORDON-TAYLOR

(Being an account of a meeting just prior to the death of Sir Gordon, and the events which led up to it.)

IN 1952 THERE came to the Royal Newcastle Hospital, New South Wales, Australia, a surgeon whose fame and reputation had preceded him by many years. He lived with us in the Resident Medical Officers' quarters for three days. In this short time we came to love him; he endeared himself to us because of his humility, simplicity, forthrightness, dignity, his keen sense of humour and proportion and above all the obvious love and affection he had for his fellow man.

His short visit was a treasured memory to those of us who were residents at the time. On taking his leave, he asked that, should any of us ever come to London, we should come and see him.

Some eight years later it fell to my lot to come to London for post-graduate study in surgery. Among the many parting instructions my seniors gave me was, "Don't forget to go and see Sir Gordon Gordon-Taylor; he will be very pleased to see you." This visit to Sir Gordon was one of the "must do" items on the list of any aspiring young surgeon visiting London. Why was this so? Because this man was known to be always kind and consistently helpful to the visiting student in a very practical way. Countless numbers of my senior colleagues and friends counselled me thus, giving me advice from their treasure-chest of experience.

Soon after my arrival in London, whilst walking along the south side of Lincoln's Inn Fields, I espied a distinguished-looking gentleman coming towards me. He was using a stick, but lightly, a trifle bent forward in his gait and wearing a double-breasted dark blue suit with—yes, a pink carnation in his buttonhole.

On being accosted with "Good afternoon, Sir Gordon," he stopped, looked up and, with a quizzical expression on his face and a twinkle in his eye, demanded, "How do you know my name?" This was the beginning of a most precious twenty minutes' conversation. He asked me my name and home town and on being told that I came from Pennant Hills, Australia, he immediately enquired, "How is my dear friend, Clyde Davis?" The Davis family of doctors have practised in friendly opposition to our family in the same village for thirty years, so I felt able to answer his query.

The conversation turned to other places and other mutual friends and acquaintances all over Australia and many questions were asked and a lot of sound advice given while we stood outside the College in the sunshine. An Italian woman with a brood of chattering youngsters interrupted our

THE LATE SIR GORDON GORDON-TAYLOR

talk with, " Coulda you please tell-a me where the College-a of Surgeons is ? " With a sweep of his hat and a stately bow, he leaned back on his stick and indicated with an outflung arm, " That, Madam, is the Royal College of Surgeons of England."

This simple act of helpfulness, so graciously performed, seemed to give him tremendous satisfaction. Little did this itinerant Italian woman realize that her problem had been solved by the man who, in all England, was probably one of the most qualified to introduce her to the College.

We talked of travel, of wars, of family separation, study, examinations, professional standards, professional integrity, of the coming cricket season, and all manner of things. Presently he took his departure, saying, " Well, I must be off—walking to Lords—four miles, you know," and as he shook my hand his last words to me were, " Remember boy, work, work, work and the very best of luck."

Little did I realize that, within the hour, this amazing man would be struck down, this professional pedestrian would be mortally wounded by one of the automobiles he hated so much.

This experience has made an indelible imprint on my mind; to have met and spoken with this great man was indeed a great privilege and honour—in all, a most humbling experience.

His place in the hearts of many, many people in this country and overseas will never be filled. We were indeed fortunate to have known him, we are the better for having known him, and we give thanks to God for his life of service and love.

R. B. G.

SAYINGS OF THE GREAT

" I hate anything that occupies more space than it is worth."

William Hazlitt, 1778-1830.

(Submitted by the Editor)

" Labour to keep alive in your breast that little spark of celestial fire, called conscience."

George Washington, 1732-1799.

" Blessed is he who has found his work; let him ask no other blessedness."

Thomas Carlyle, 1795-1881.

(Contributions are invited)

ADMISSION TO THE HONORARY FELLOWSHIP

AFTER THE DINNER of the International Federation of Surgical Colleges on 20th October 1960, Professor E. Dahl-Iversen of Denmark and Professor J. F. Nuboer of Holland were admitted to the Honorary Fellowship of the Royal College of Surgeons of England.



Fig. 1. Professor Dahl-Iversen being admitted to the Honorary Fellowship by the President, Sir Arthur Porritt, with Sir Harry Platt, Bt., looking on.

Introducing Professor Dahl-Iversen (Fig. 1), Professor Ian Aird spoke thus:

" Mr. President: Erling Dahl-Iversen was born on 30th November 1892 in Frederiksberg in the very heart of Copenhagen, surrounded by Copenhagen, of Jutland parents. He started medicine in 1911, was licensed in 1919 and graduated Doctor of Medicine—a higher degree in Scandinavia—in 1925. He attained the rank of Consultant in 1932, was appointed to the Chair of Surgery in Copenhagen in 1935 and, shortly after, to the Directorship of the Department of Surgery in the University Hospital.

" He has made contributions to many branches of surgery, but he has attained world-wide fame particularly in the surgery of the endocrine glands. Not only has he published several works on general and endocrine surgery, and a century of articles, but he has stimulated from his department a vast flow of original surgical advances.

" Honours have been deservedly showered upon him. He has been a Knight since 1947, a Knight First-Class since 1955 and a Knight-Commander since early this year, of the Order of Dannebrog.

" He has been Chairman of the Danish Surgical Society, and General Secretary of the Scandinavian Surgical Society and for ten years has been Editor-in-Chief of *Acta Chirurgica Scandinavica*, a journal which, very conveniently for us, is published in the English language and for which we all here have the very highest respect.

" Dahl-Iversen has travelled and lectured extensively abroad and is an Honorary Member of a dozen foreign surgical societies. He is Vice-President of this Federation and President of the International Society of Surgery, perhaps the highest international

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ADMISSION TO THE HONORARY FELLOWSHIP

recognition that can be afforded to a surgeon, and it is afforded to very few. He is an Honorary Fellow of the American College of Surgeons.

"Oscar Thorvold Block was made an Honorary Fellow of this College, and he died in 1926. Since that time, we have had no Dane in our Honorary Fellowship. It is high time that we now had one, and Dahl-Iversen has been well worth waiting for to fill the gap.

"Danes have not always been so welcome here. Not far from this very spot they used to land for their summer trips and the soil under where every one of us is sitting has probably been trampled by Danish feet in cross-gartered stockings. These trips were subsidized by Travelling Scholarships provided by our English ancestors and called at that time Danegeld. We gave them titles then, too; we even gave a crown to Canute.

"From what I know of the masculine charm of the Danes, I imagine there is a good deal of Danish blood still in English circulation.

"Our relations are different now and we like to think that English surgery is very close to Danish surgery, and Scandinavian surgery in general, just as we like to think our peoples and ways of life are closely linked also. Each Scandinavian country has at least once in the past been an immense imperial power, but the Scandinavian empires have all contracted and these countries now have taught us how, even without immense military strength, a relatively small nation can give us all a lesson in civilized living, in culture, in science and in dignity. I hope we, for our part, can take advantage, if the need arises, of their example.

"I have spoken of the professorial and academic attributes of Dahl-Iversen. There are others that qualify him for any fellowship, however extensive. He is a kindly, warm and friendly fellow, hospitable to an unlimited degree, and sometimes with, as you see now, a rather puckish expression which very truly illustrates his ready humour.

"I think he has no real hobby other than his work, his home and his family. When you ask after his family, he says, 'They are all very well—Mrs. Dahl-Iversen, my sons and the two dogs.' It might be said that the two dogs are his hobbies. These two Scottish Terriers, Finnian McDalle and Loren, follow him everywhere, and there have been innumerable student caricatures of the Professor in improbable situations followed always by his dogs. Dahl-Iversen is a kindly man and his lovely town house in the precincts of his University and Hospital, presided over by his gracious lady, has provided a perfect setting for a distinguished academic and busy clinical life.

"Mr. President, I present to you Professor Erling Dahl-Iversen for admission to the Honorary Fellowship of this College."

Professor Digby Chamberlain gave the following citation in honour of Professor Nuboer:

"Mr. President, Members of Council, Ladies and Gentlemen: Johannes Franciscus Nuboer, M.D. in the University of Utrecht, Honorary M.D. in the University of Paris, Honorary Fellow of the American College of Surgeons, Professor of Surgery in the University of Utrecht and until a fortnight ago its Rector Magnificus, past president of the Dutch Society of Surgery and an active member of the International Federation of Surgical Colleges, is well known to many of us and is known to all of us by repute. He belongs to a country which is similar in many ways to our own, a small country with a far-spread colonial empire, depending for its existence on long sea lines of communication. It is inevitable that in our history we should have had very close relations one with another, and although they may not have been too cordial in the past, they are now close and friendly at all levels. Holland has a proud past in medicine and in surgery. Utrecht is its second oldest University, having been founded in 1636, and its Chair of Surgery has had many distinguished holders, including such names as Von Eiselsberg.

"Professor Nuboer has worthily upheld its traditions from both the scientific aspect and from the point of view of international relations. He is widely known for his work on malignant disease of the upper end of the stomach and the lower oesophagus, and he has advocated a tube from the greater curvature, which is sometimes known as the Nuboer tube. He is also known for his work in the thorax and on the heart. Everyone who has visited him will have been impressed by his energy and by the amount of first-class work which is carried out by him and his assistants.

ADMISSION TO THE HONORARY FELLOWSHIP

"In his own country he is regarded as the doyen of surgery, and earlier this year the Dutch Archives of Surgery brought out a number dedicated to him on his 60th birthday. He is surgeon to the Dutch Royal Family, with whom he has a very close personal friendship.

"He is a keen and a first-class shot and he has shot game in many parts of the world. His next trip, I understand, is to be to Persia, although I do not know what he proposes to shoot there.

"On a more personal level, I have known Jan Nuboer and his family very well indeed for many years. As a great admirer of his, I am proud to have the privilege of presenting him to-day and I think the College is honouring itself in adding his name to our roll of Honorary Fellows.

"Mr. President, I have the honour to present to you to receive at your hands the Honorary Fellowship of this College Johannes Franciscus Nuboer."

ANATOMICAL MUSEUM

THE SPECIAL DISPLAY for the month of December consists of historically interesting specimens from the museum including microscope slides purchased by John Hunter from the sale of William Hewson's museum.

A LETTER FROM JOHN HUNTER

THE COLLEGE HAS recently bought an interesting autograph letter from John Hunter to his friend William Eden, first Lord Auckland, who was serving as a special envoy to an international Congress in Holland. The text is as follows:

My dear Lord

we take it very kind in your Lordship to communicate to us what you know will give us pleasure; we are first happy that Lady Aukland (!) is so well recover'd, and of your having a find (!) Dutch built Boy, who I hope will smook a Pipe, by the time we pay him a visite at Beckinham in the summer but unluckly (!) he will not winter in Holland to learn to skite (!) before we see him. Of the six nations do you find them of six dispositions. Is the Englishman a good honest blunt fellow? Does the Irishman make Bulls with a strange twist in his mode of thinking? Is the american a republican? Is the Spaniard Jellous? and whether is the Frenchman a Democratic or an aristocratic (!)? as to the Dutchman there will no knowing what he will be for some months to come. My Head and Heart I think are nearly the same as they have been for some years; and if they do not grow worse I shall be contented. Give our best respects to Lady Aukland (!). I fancy anny will write to her Ladyship and believe me to be with great respect and esteem your Lordship

Much obliged

JOHN HUNTER

London Apr. 29th (1790)

INTERNATIONAL FEDERATION OF SURGICAL COLLEGES

THE INTERNATIONAL FEDERATION OF SURGICAL COLLEGES was honoured by a visit from H.R.H. The Duke of Edinburgh during a three-day meeting in the Royal College of Surgeons of England, 18th-20th October. The Duke was welcomed by Sir Arthur Porritt, President of the College, and Sir Harry Platt, Bt., President of the International Federation. He took tea with the members of the Federation's Council, and in conversation showed a lively interest in the medical affairs of their different countries (Fig. 1).



Fig. 1. Professor Nuboer being introduced to H.R.H. The Duke of Edinburgh by the President of the International Federation, Sir Harry Platt, Bt., with the President of the College, Sir Arthur Porritt, on the right of the picture. Professor Nuboer had been admitted to the Honorary Fellowship of the College (see p. 429).

At a meeting of the Council of the Federation it was announced that the Swiss Surgical Society and the Philippine College of Surgeons had entered into membership. Professor E. Dahl-Iversen of Denmark was re-elected Vice-President and Dr. Oscar Schuberth of Sweden and Dr. A. Dumont of Belgium were re-elected members of the Executive Committee. It was arranged that the next meeting should be in September 1961, in Oslo, with Surgical Research as its general theme. The 1962 meeting will be in Paris and that for 1963 probably in the United States.

INTERNATIONAL FEDERATION OF SURGICAL COLLEGES

As the result of a report from one of its Working Parties, the Council agreed that the following topics were most suitable for research on an international basis:

- Malignant disease
- Infection in wounds
- Transplantation of tissues and organs
- The care of mass casualties.

It was observed that the Working Party on the Training of Surgeons was collecting information about the training in different countries with a view to drawing up a scheme for the guidance of less well developed countries.

A Working Party on Surgical Missions seeks collaboration with important international organizations, in respect of educational missions. As regards aid to civil disasters, the Federation recognizes the importance of the availability of the medical services of the armed forces in the early stages of a catastrophe.

A fourth Working Party emphasizes the great importance of the interchange of young surgeons between countries, but notes the financial and administrative difficulties which have to be overcome in certain cases. It is hoped to convince governments of the desirability to interchange and to obtain their help.

The International Federation hopes to issue brochures from time to time on subjects such as these.

At the open sessions the general theme of the meeting was the Training of Surgeons, and just over 100 delegates took part. Opportunity was taken to show to the surgeons from other countries as much as possible of the work of training surgeons now being carried out within this College. A morning was devoted to listening to a part of the Royal College of Surgeons course for postgraduate students, lectures on Anatomy, Pharmacology and Physiology being visited. Two sessions were devoted to short communications on research work, one being contributed by the American College of Surgeons and the other jointly by the Royal College of Surgeons of Edinburgh, the Royal College of Surgeons in Ireland and the Royal Faculty of Physicians and Surgeons of Glasgow.

A talk on the extensive work of training surgeons in the College was given by Professor Digby Chamberlain, and Mr. Harold Edwards described the policy of the College for the further surgical training of those who have passed the Final Fellowship Examination.

The members of the International Federation Council dined one evening in the Nuffield College of Surgical Sciences and were thus enabled to meet the College's 90 resident students, who are postgraduates from many different parts of the world.

INTERNATIONAL FEDERATION OF SURGICAL COLLEGES

An open discussion on the training of surgeons evoked valuable contributions from Britain, France, Germany, Holland, Belgium, Austria, Norway, Sweden, Switzerland, India and the United States.

At the dinner the health of the International Federation was proposed by the Minister of Health (the Rt. Hon. Enoch Powell) and Sir Harry Platt replied. Two prominent members of the Federation Council were admitted to the Honorary Fellowship of the Royal College of Surgeons of England, Professor E. Dahl-Iversen of Copenhagen and Professor J. F. Nuboer of Utrecht.

It is hoped to publish a much fuller account of this meeting at a later date.

COLLEGE PUBLICATIONS

READERS ARE REMINDED that the following publications issued or sponsored by the College may be obtained from the Editorial Secretary, Royal College of Surgeons of England, Lincoln's Inn Fields, London, W.C.2.

A Catalogue of the Portraits and other Paintings, Drawings and Sculpture in the College. By William LeFanu, Librarian. 184 pages with 4 coloured and 52 black and white plates. £1 10s. 0d. (postage 1s. 9d.).

The History of the College. By Sir Zachary Cope, F.R.C.S. 376 pages, fully illustrated. £3 3s. 0d. (plus 2s. postage).

Lives of the Fellows, 1930-1951. By the late Sir D'Arcy Power, K.B.E., F.R.C.S., Honorary Librarian, and continued by W. R. LeFanu, M.A., Librarian. A single volume, bound in blue cloth, of 889 pages, containing the Lives of all Fellows known to have died between 1930 and 1951. £2 2s. 0d. post free.

A Record of the Years from 1901 to 1950. Edited by Sir Ernest Finch, M.D., M.S., F.R.C.S. A slim volume, illustrated, containing a brief history of the College between the centenary and the 150th anniversary of the foundation with lives of all the Presidents since 1900, written by special contributors from their personal knowledge. In red cloth 9s. post free or red paper covers 5s. 6d. post free.

A Guide to the Hunterian Museum (Physiological Series). This gives a brief account of the physiological section of John Hunter's museum, the scope, design and historical value of which is unique. 48 pp. 1s.

A Descriptive and Historical Catalogue of the Darwin Memorial at Down House. Charles Darwin and his family lived at Down House, near Orpington, Kent, for forty-two years and it was here that most of his scientific investigations were made, including his work on the Origin of Species, published in 1859. 33 pp. 1s.

The Portraiture of William Harvey. The Thomas Vicary Lecture for 1948 by Sir Geoffrey Keynes, M.A., M.D., F.R.C.S. With a descriptive catalogue and 33 reproductions of the portraits. £1 5s. 0d.

**William Clift.* By Jessie Dobson, B.A., M.Sc., Anatomy Curator. A biography, fully illustrated, of the first Conservator of the Museum at the College. Published by William Heinemann Medical Books Ltd. Bound in blue cloth; 144 pages with frontispiece portrait and 31 plates. 8s. 6d. post free.

The present position of cardiac surgery. The Bradshaw Lecture for 1957 by Sir Russell Brock, M.S., F.R.C.S. Blue cloth binding, 6s. 0d. post free.

*A separate cheque for this publication would be appreciated.

PROCEEDINGS OF THE COUNCIL IN NOVEMBER

AT A MEETING of the Council on 10th November 1960, with Sir Arthur Porritt, President, in the Chair, Dr. W. E. Lloyd was admitted to the Board of Examiners for the Fellowship in the Faculty of Anaesthetists.

Arrangements were made whereby the Professorship of Military Surgery at the Royal Army Medical College should become a joint Professorship with the Royal College of Surgeons, and the present holder, Colonel J. C. Watts, O.B.E., M.C., F.R.C.S., was accepted as the first Joint Professor under the new arrangement.

The programme was drawn up for the Annual Meeting of Fellows and Members on 7th December 1960.

One Diploma of Fellowship in Dental Surgery was granted.

The Hallett Prize was awarded to J. L. Mercer of St. Thomas's Hospital Medical School on the result of the October Primary Examination for the Fellowship, at which 38 candidates out of 195 were successful.

The Begley Prize was awarded to Joseph Brown of King's College Hospital Medical School, the best candidate in surgery at the recent examination for the diplomas of M.R.C.S. and L.R.C.P.

Diplomas of Membership were granted to 104 candidates.

Licences in Dental Surgery were granted to 98 candidates.

The Council gratefully received a number of gifts, including a head of Sir Cecil Wakeley, Bt., by Elsie Pentland, and Mr. James Gunn's sketch for his portrait of Sir Gordon Gordon-Taylor: this was presented by the artist himself.

A gift of 1,000 guineas from Mr. R. J. McNeill Love is to be devoted partly to an exhibition case for the collection of pharmacy jars, partly to a fund for College publications, and partly for a medal for exceptionally meritorious service by members of the staff.

The following hospitals were recognized under paragraph 23 of the Fellowship Regulations:

HOSPITALS	POSTS RECOGNIZED		
	General (6 months unless otherwise stated)	Casualty (all 6 months)	Unspecified (all 6 months)
KINGSTON — County Hospital (additional)			S.H.O. (Cas. and Orth.)
LONDON — Metropolitan Ear, Nose and Throat Hospital at St. Mary Abbot's Hospital (additional)			<i>Under para. 23 (c)</i> Registrar (12 months) 2 House Surgeons

PROCEEDINGS OF THE COUNCIL IN NOVEMBER

HOSPITALS	POSTS RECOGNIZED		
	General (6 months unless otherwise stated)	Casualty (all 6 months)	Unspecified (all 6 months)
WEST BROMWICH and District General Hospital (additional)	Regr. (12 months) instead of 6 months as previously)	S.H.O.	
SOLIHULL Hospital (additional)	Regr.		
SUTTON and Cheam General Hospital (additional)	2nd H.S.		
MANCHESTER—Victoria Memorial Jewish Hospital (redesignation)		Redesignation Deputy Resident Surgical Officer re- graded from S.H.O. to J.H.M.O.	
GRAVESEND and North Kent Hospital (redesignation)		Redesignation 2nd Cas. Off. and Orth. H.S. post up- graded to Senior House Surgeon	
BELFAST — Ulster Hospital for Women and Children	Posts of S.G.O., Surg. Regr. and H.O. to be recognized under the unspecified category, <i>not</i> in general surgery.		
ROTTERHAM — Doncaster Gate Hospital (additional)	2nd S.H.O.		

OPHTHALMOLOGICAL POSTS

Extension of period of recognition from 6 to 12 months under
para. 23 (b)

HOSPITALS	
SUNDERLAND—Eye Infirmary	3 S.H.Os.
DONCASTER — Royal Infirmary	H.S.

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THE DESIGN is a College crest (an eagle proper holding a mace of gold) repeated on a maroon background. The tie is made in pure silk or silk and rayon, and also available are squares in the same design and tubular scarves. These may be worn by the following: Fellows and Members of the College; Fellows and Licentiates in Dental Surgery; Fellows of the Faculty of Anaesthetists; Holders of the special diplomas granted by the Royal Colleges through the Conjoint Board; postgraduate students attending educational courses at the College. The tie can be obtained from Messrs. T. M. Lewin & Sons Ltd., 1-3, Jermyn Street, St. James's, London, S.W.1.

BINDING OF THE ANNALS

BINDING CASES ARE not provided for completed volumes of the ANNALS but the Editor can recommend the firm of Lovett, Bookbinders, 86, Plashet Grove, London, E.6, who will undertake the binding in buckram or leather to individual requirements at reasonable prices.

DONATIONS

DURING THE LAST few weeks the following generous donations have been received:

Appeal Fund—Donations:

£100,000	Lilian May Coleman Trust Fund (for cancer research) (further gift)
£10,000	Jack Cotton Charitable Trust Fund (further gift)
£1,450	Joseph Collier Charitable Trust
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	Mrs. Madge Manning
	Anonymous donor

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£10 p.a. for 7 years + tax	Permal, Ltd. (Glos.)

McIndoe Memorial Fund:

\$25	Dr. Marton L. Griswold, Jr., M.D.
£5	Hertford and District R.A.F. Association
£2	C. Pye-Smith, Esq., D.S.O., M.C., F.R.C.S.

Research Department of Anaesthetics:

£2,500	Glaxo Charitable Trust (further gift)
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Donations and voluntary annual subscriptions by Fellows:

The following Fellows of the College and Fellows in the Faculty of Anaesthetists have generously given a donation to the College or have undertaken to make a voluntary annual subscription under covenant:

H. F. Anderson, F.R.C.S.	J. L. Linacre, F.F.A.R.C.S.
Lt. Col. S. O. Bramwell, M.B.E., F.F.A.R.C.S.	D. H. Patey, F.R.C.S.

DIARY FOR DECEMBER

Wed.	14	5.00	Hunterian Lecture—Professor O. DANIEL—The complications of diversion of the urinary stream.
Thurs.	15	5.00	Arris and Gale Lecture—MR. L. TURNER—The structure of arachnoid granulations, with observations on their physiological and pathological significance.
Fri.	16		Basic Sciences Lectures and Demonstrations and Dental Lectures and Clinical Conferences end.
Wed.	21	5.00	Board of Faculty of Anaesthetists.
Fri.	23		Last day for nomination of candidates for election to the Board of Faculty of Anaesthetists.
Sat.	24		College closed.
Mon.	26		College closed.
Tues.	27		College closed.
Wed.	28		College closed.

DIARY FOR JANUARY

Tues.	3		Final Membership Examination begins.
Thurs.	5		D.I.H. Examination begins.
Tues.	10		Final F.D.S. Examination begins.
Thurs.	12	2.00	Quarterly Council.
		5.00	Hunterian Lecture—Professor F. G. ELLIS—The aetiology and treatment of achalasia of the cardia.
Tues.	17	5.00	Final F.F.A. Examination begins.
			Erasmus Wilson Demonstration—DR. D. C. CALDWELL—Radio-active isotopes in a chemical laboratory.
Fri.	20	5.00	Board of Faculty of Dental Surgery.
Mon.	23		Basic Sciences Lectures and Demonstrations begin.
Wed.	25		Primary F.R.C.S. Examination begins.
		5.00	Arnott Demonstration—Professor G. W. CAUSEY—An appreciation of the fine structure of some of John Hunter's specimens.
Thurs.	26	5.00	Arris and Gale Lecture—MR. N. G. ROTHNIE—Changes in blood coagulation due to perfusion for open heart surgery.

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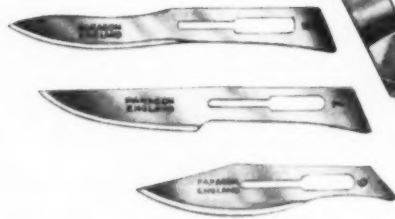
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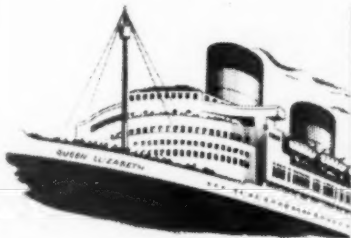
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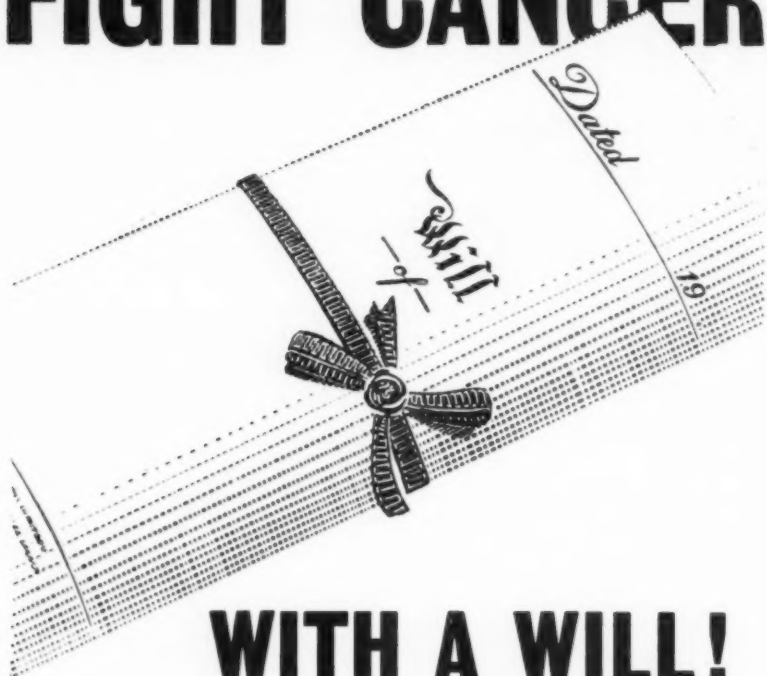
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Write for further information to A. Dickson-Wright Esq., M.S., F.R.C.S.
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2. Haematogenic Factors. Of all the factors required for blood formation, only three are likely to be limited in the diet - iron, vitamin B₁₂ and folic acid. One cup of Bovril will supply 35% of the adult's daily

requirement of vitamin B₁₂ (cyanocobalamin) and 20% of the folic acid.

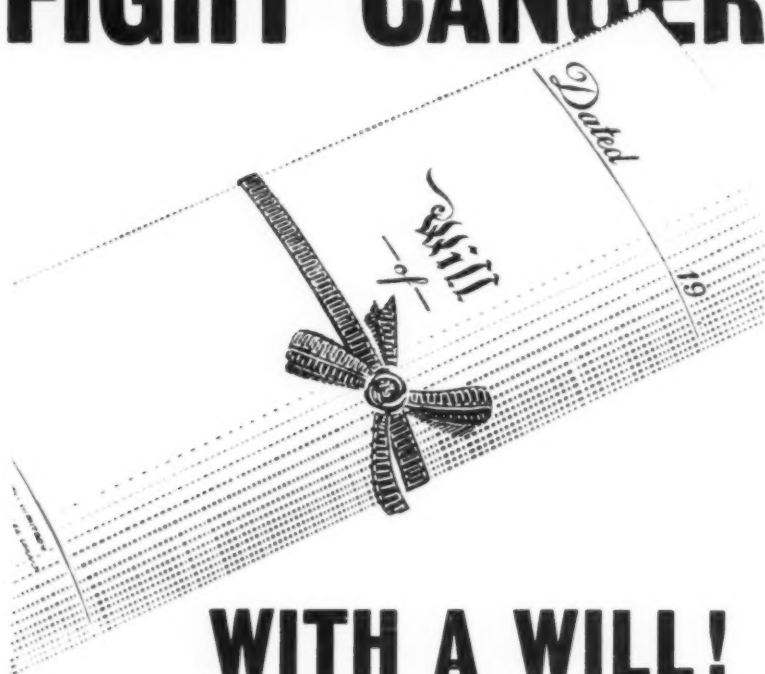
3. Gastric Secretion. The unique mixture that is Bovril is the most powerful known stimulant of gastric secretion - even more powerful than meat extract itself. It is, therefore, particularly useful for elderly patients and convalescents.

4. Appetite. A major factor in the rapid recovery from serious illness or major surgery is a good intake of protein foods. Poor appetite can delay recovery. Bovril is a great help in promoting good appetite while stimulating gastric secretion.

Every ounce of Bovril contains: 1.02 mg riboflavin, 6.8 mg niacin, 1.1 µg vitamin B₁₂, 68 µg folic acid.

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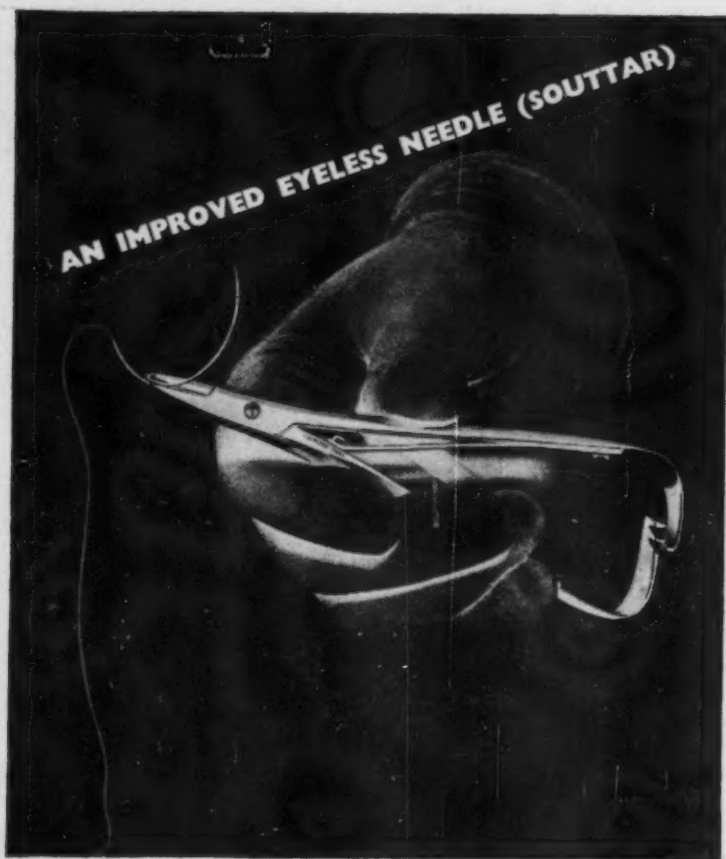
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